MURRAY CENTENNIAL PUBLIC SCHOOL ADDITION

654 County Rd. 40, Trenton, Ontario K8V 5P4

KAWARTHA PINE RIDGE DISTRICT SCHOOL BOARD

ARCHITECTURAL SPECIFICATIONS
PROJECT MANUAL VOLUME 1

Moffet & Duncan Architects Inc.
Prime Consultant

DVM Engineering Inc.
Structural Engineer

CIMA +
Mechanical and Electrical Engineers

CIMA +
Site Services

VOLUME 1 ARCHITECTURAL SPECIFICATIONS

DIVISION 04 - MASONRY

DIVISION 05 - METALS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

DIVISION 08 - OPENINGS

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVITION 11 - EQUIPMENT

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DIVISION 31 - EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

DIVISION 33 - UTILITIES

VOLUME 2 MECHANICAL AND ELECTRICAL SPECIFICATIONS

VOLUME 3 SUPPLEMENTARY INFORMATION

1. Geotechnical Investigation Report by Cambium, Project No. 17462-001, dated March 27, 2024.

2. Topographical Survey by Acadia Engineering, Project No. 23-245, dated May 18, 2023.

3. Tree Inventory by Acadia Engineering, Project No. 23.245, dated June 7, 2023.

4. Subsurface Utility Plan by Onsite Locates Inc., Project No. 23-46-35082, dated January 24, 2024.

5. Sunshade Structure Drawings by MVW, Project EP#23007, dated May 17, 2023.

6. Hazardous Building Materials Assessment and Specifications by Pinchin, File No. 335495.031, dated May 10, 2024.

7. Supply Well Inspection Report by Cambium, Project No. 11767-001, dated November 14, 2023.

8. Storm Water Management Report - Report by CIMA+., dated June 10, 2024.

Architectural
Moffet & Duncan Architects Inc.

Structural
DVM Engineering Inc.

Mechanical
CIMA +

Electrical
CIMA +

Site Services
CIMA +

The seals above pertain to the specification sections bearing the name of the relevant consultant at the bottom of each page.

1.1 **GENERAL**

.1 The documents listed below are enclosed in the Supplementary Information volume.

.2 Supplementary information is made available to assist the Contractor in the preparation of their bid and does not form part of the Contract Documents for this project.

1.2 **GEOTECHNICAL REPORT**

.1 Geotechnical Investigation Report by Cambium, Project No. 17462-001, dated March 27, 2024.

1.3 **TOPOGRAPHICAL SURVEY**

.1 Topographical Survey by Acadia Engineering, Project No. 23-245, dated May 18, 2023.

1.4 **TREE INVENTORY**

.1 Tree Inventory by Acadia Engineering, Project No. 23.245, dated June 7, 2023.

1.5 **LOCATES**

.1 Subsurface Utility Plan by Onsite Locates Inc., Project No. 23-46-35082, dated January 24, 2024.

1.6 **SUNSHADE STRUCTURAL DRAWINGS**

.1 Sunshade Structure Drawings by MVW, Project EP#23007, dated May 17, 2023.

1.7 **HAZARDOUS MATERIALS REPORT & SPECIFICAITONS**

.1 Hazardous Building Materials Assessment and Specifications by Pinchin, File No. 335495.031, dated May 10, 2024.

1.8 **SUPPLY WELL INSPECTION REPORT**

.1 Supply Well Inspection Report by Cambium, Project No. 11767-001, dated November 14, 2023.

1.9 **EXISTING DRAWINGS**

.1 Existing drawings available to bidders upon request.

1.10 **STORM WATER MANAGEMENT REPORT**

.1 Storm Water Management Report - CIMA + - June 10, 2023

END OF SECTION

1.1 CONTRACT DOCUMENTS

.1 Contract documents for work under this contract consist of the documents listed in Article A-3, Contract Documents, of the Stipulated Price Contract CCDC2-2020, as amended by the Supplementary Conditions included in Division 00 - Procurement and Contracting Requirements.

1.2 SUMMARY OF WORK

.1 The purpose of the Contract is the construction of a new one storey masonry addition to an existing one storey masonry elementary school, with related work. The existing Murray Centennial Public School is located at 654 County Rd 40, Trenton, ON K8V 5P4.

.2 The scope of Work shall be as indicated in the Contract Drawings and Specifications.

.3 The scope of Work includes demolition and renovation work to the existing elementary school building.

.4 The existing school will be occupied throughout the construction of the new addition. Coordinate with the Owner and refer to **1.3 Phasing** in scheduling construction operations to minimize disruption to the use of the existing school. Additional measures are required to ensure the safety of students and other users of the existing building, as outlined below.

.5 Site work is to include, but is not limited to, new paving for driving lanes, play areas, fire route, and parking stalls, new concrete sidewalks, artificial turf play areas, planting, steel frame garbage enclosure, and site signage.

.6 New wood frame shade structure is to be constructed by cash allowance.

.7 The existing septic system is to be decommissioning and replaced with new septic system.

.8 The existing well water supply is to be decommissioning and replaced with new Municipal water supply. Existing abandoned well water supply below addition is to be removed. Refer to Section 33 10 00.

.9 The existing firefighting cistern is to be decommissioned, removed, and replaced with new on-site fire hydrants.

.10 Portions of the existing stormwater drainage system are to be removed and replaced with new. New underground storm infiltration tanks and infiltration trench are to be installed.

.11 Six (6) existing portables are to be relocated during course of work. Work to be performed by cash allowance.

.12 One existing portable is to be removed off site by Cash Allowance.

.13 Paved pathway and wood stairs to portables to be removed.

.14 Interior renovations to existing classrooms and kindergarten rooms to accommodate new addition and temporary exit doors.

.15 The work will be phased, see below.

1.3 **PHASING**

.1 As the school, Murray Centennial Public School, will be occupied during the construction period, the work within the contract will be phased to mutually accommodate and segregate school use and construction activities. The phasing sequence intent is as follows:

.1 **Phase 1**

.1 Phase 1 period work will be completed between **October 1, 2024** and **October 31, 2024**. **Phase 1** period work is to primarily prepare the school site and provide specific building upgrades to facilitate school functions during the course of construction. Work in this phase is to be expedited to mitigate disruption to on-going school operations. Work is to include the following, but are not limited to:

.1 Existing Septic system, located primarily in the north play field, is to remain operational during course of **Phase 1-3.**

.2 Existing water supply to the school and on-site fire fighting cistern is fed from an on-site well located near the south-west corner of the school property. Depth of existing water supply line estimated at 1.7m below grade. This well is to remain operational during the course of work and is only to be decommissioned when the new municipal water supply to the building, sprinkler system, and on-site fire hydrant are commissioned in **Phase 3**. The General Contractor is to undertake precautions so as not to damage or disrupt the existing school water supply during construction.

.3 Maintain public access to the on-site fire fighting cistern during the course of **Phase 1-3**.

.4 Maintain public path of travel to & from existing exit doors V10, H9a, 21, & 23 located at west end of the school. Provide construction hoarding to protect path of travel during course of **Phase 1** work. Refer to **Phase 1** Diagram 2/A1.3 for location of existing doors to remain operational during **Phase 1** work.
Protected path of travel to these existing doors are to be removed at end of **Phase 1**.

.5 Provide renovations to existing classrooms and corridors to facilitate temporary exits that are to remain in use during the course of **Phase 1 - 2.** This includes work in ex. Kindergarten Rooms 115, 120, 121, 135, ex. Classrooms 114-1, 114-2, 114-3, ex. Kindergarten WC 120A, and Ex. Corridor H9, H4, and H55. To minimize disruption, all work in ex. Kindergarten 121, ex. Classrooms 114-1, 11402, 114-3, ex. Corridor H9, H4 and H5 is to be performed after hours and on weekends.

.6 Remove existing chain link fence and top 600mm of concrete pad located at the south west corner of the existing school. Locally provide new asphalt and 6 new temporary precast concrete curbs to protect new temporary exit door H9B.

.2 **Phase 2**

.1 **Phase 2** period work will commence **November 1, 2024** and be complete by **June 30, 2025**. **Phase 2** comprises the completion of the majority of addition construction and work along the west end of the site, including, but are not limited to:

.1 Relocate construction hoarding upon completion of temporary exit doors H5B, H9B, and renovations to facilitate temporary exit in Kindergarten 135, Kindergarten 115, Corridor H9, Kindergarten 120, Kindergarten 121, Classroom 114-3, and Corridor H5.

.2 Complete site work along west end of site, including new parking, student drop-off loop, paved play area, storm system, septic bed and biofilter system.

.3 Complete majority of new addition building work.

.3 **Phase 3**

.1 **Phase 3** period work will commence **July 1, 2025** and be complete by **August 29, 2025. Phase 3** comprises the substantial completion of the remaining work, commissioning of new services and decommissioning of existing services.

.1 New septic system to be completed and commissioned. Upon completion of new septic system, existing septic system to be decommissioned. Work to connect new septic system to existing building's sanitary line will require temporary disconnection and shutdown of the existing sanitary system. As a result, it is critical that commissioning of new septic system be completed in the **Phase 3** summer construction window so as not to cause significant disruption to school activities when students return in **Fall 2025**.

.2 Relocate Six (6) existing portables from their current location north of the school building to new location in the west play area. Removed paved walkway and wood stairs. Re-sod area.

.3 Extend new Municipal water supply from access point at County Road 40 to the rear of the school, running below the south driving lane. Connect new Municipal water supply to addition through Sprinkler Room located at south west corner of the building. Once new municipal water supply is complete, commission new Sprinkler system, new on-site fire hydrant, and new domestic water supply. Work to complete new Municipal water supply connection will result in temporary shutdown of existing well water supply to the existing building and existing on-site fire fighting cistern. As a result, it is critical that commissioning of new water supply, sprinkler system, and on-site fire hydrant be completed in the **Phase 3** summer construction window so as not to cause significant disruption to school activities when students return in **Fall 2025**.

.4 Decommission existing on-site firefighting cistern upon completion of new water supply hook-up, new on-site fire hydrant, and new sprinkler system located within the addition.

.5 Decommission existing well upon completion of new water supply hook-up, new on-site fire hydrant, and new sprinkler system located within the addition.

.6 Remove temporary interior partitions and doors as part of alternate exiting strategy. Perform interior renovations.

.7 Complete installation of new storm water system, including new storm water retention tank, infiltration gallery, catch basins, manholes, and storm lines.

.8 Complete site improvements in north play area, including regrading, paving, painted lines, play equipment, sun shade structure, and armour stone seating, and sodding.

.9 Complete site improvements to south and east parking lot, including paving, concrete curbs, painted lines, garbage storage area, bollards, site lighting, and sodding.

.2 Portable Relocation by Cash Allowance

.1 Six (6) existing portables (~ 9800mm x 7200mm) are to be relocated in **Phase 3** to the new west play area.

.2 One (1) existing portable is to be removed from site in **Phase 3** to a location determined by the Owner.

.3 The General Contractor is to retain Pollard the Mover (705)324-2292, who is to perform the relocation of portables, removal/reinstallation of concrete pier foundations, and removal/installation of anchorage.

.4 The General Contractor is to retain Willowbrook Ltd. (905) 260-1651, who is to perform Electrical supply, communications, fire alarm, security disconnect/reconnect, as well as plywood skirting removal/installation/painting and existing wood stair railing relocation.

.5 The General Contractor is responsible for coordinating portable relocation with subcontractors and providing site preparation in anticipation of portable and stairs relocation work. Removal of ex. paved pathway to portables and paved walkway by General Contractor.

.3 Sunshade Structure Design and Construction by Cash Allowance

.1 One (1) wood frame sunshade structure is to be provided in the north play area. The design and construction of the shade structure is by Cash Allowance.

.2 The General Contractor is to retain MVW Construction (705) 324-7281 for the design of the sunshade structure. Scope of design work is to include the Design, Permitting, and General Review (2 site visits) of the sunshade structure. Location of sunshade structure is as per Contract Drawings.

.3 The construction of the sunshade structure is to be performed by a subcontractor of the Owner's choosing. The General Contractor is to retain the Subcontractor selected by the Owner and be responsible for the coordination of their work. All costs associated with sunshade structure construction is to be by Cash Allowance

1.4 **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.

1.5 **PLAYGROUND EQUIPMENT**

.1 Play structure is to be purchased and installed by Cash Allowance.

.2 Play structure testing is to be by Cash Allowance.

1.6 **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 co-ordinating 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 & 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.

1.7 **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 make himself familiar with conditions on the roadway which may affect construction ie location of services, site access, etc.

.4 Refer to - Procurement and Contracting Requirements for Pre-Bid Meeting Details.

1.8 **MUNICIPAL BYLAWS**

.1 Conform to City of Quinte West noise by-laws. The bylaw prohibits loud noises which are likely to be disturbing to residents, but permits noise due to construction activities between the hours of 7:00 am and 7:00 pm, "on any day that is not a holiday", Hours of operation must take the noise bylaw into consideration.

1.9 **ACCEPTANCE OF WORK IN PLACE**

.1 Before starting 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.

1.10 **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 Perform 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 & 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 or elements 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. Surface mounted conduit, pipes, etc. will be rejected.

.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.

1.11 **SECURITY**

.1 The Contractor shall be responsible for security of all areas affected by the Work of this Contract until taken over by the Owner. Steps shall be taken to prevent entry to the Work by unauthorized persons and to guard against theft, fire and damage by any cause.

.2 A regular full-time watchman will be required on site from Substantial Performance of the Work until Occupancy by the Owner. During this time the Contractor must have a watchman on site whenever construction personnel are not on site, ie nights, weekends, holidays, stoppages, etc. In addition if, in the opinion of the Consultant, the Work is not adequately protected by the Contractor at any time prior to this, the Owner may demand that a watchman be employed by the Contractor at no extra cost to the Contract. The cost of site security at any time during the contract shall be fully borne by the Contractor.

1.12 **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.

1.13 **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.

1.14 **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.

.6 All fasteners exposed on the exterior must be stainless steel.

1.15 **SUPPLY AND INSTALL**

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

1.16 **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.

1.17 **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 co-ordinating 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.

1.18 **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, chalkboards, 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, writing boards, 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.

1.19 SPECIAL REQUIREMENTS FOR OCCUPIED BUILDINGS

.1 All work outside of the construction enclosure must be scheduled with the school principal when the school is occupied.

.2 Do not interfere with building access, particularly in the 30 minutes before school commences each day and 30 minutes before and after the school day ends. Confirm timing of school day start and end, and lunch times, with school principal.

.3 All work which will result in excessive noise, dust, odours, or other unpleasant or unhealthy situations, shall take place outside of school hours, on evenings, weekends, or school holidays. Asphalting on roof and asphalt paving, in particular, must be scheduled when school building is unoccupied.

.4 Ensure continuity of all utilities, including power and water, to existing school. Schedule any required interruptions outside of school hours, in coordination with the school principal.

.5 Suppress dust, avoid conditions likely to disperse mould or fungus of any kind, and take steps reasonably necessary to maintain the safety and comfort of the building occupants.

.6 Cease any activity if advised by the school principal, or vice-principal that it is disruptive or offensive to building occupants.

.7 Workers are not permitted to use school parking areas and must park within construction enclosure.

1.20 **SPECIAL REQUIREMENTS AFTER BUILDING OCCUPANCY**

.1 Once the school is occupied, all work must be scheduled with the school principal.

.2 Maintain all emergency exits at all times. Do not interfere with building access, particularly in the 30 minutes before school commences each day and 30 minutes before and after the school day ends. Confirm timing of school day start and end, and lunch times, with school principal.

.3 All work which will result in excessive noise, dust, odours, or other unpleasant or unhealthy situations, shall take place outside of school hours, on evenings, weekends, or school holidays. Asphalting on roof and asphalt paving, in particular, must be scheduled when building is unoccupied.

.4 All construction and delivery vehicles shall be escorted onto site and on site by a flagman.

.5 Ensure continuity of all utilities, including power and water. Schedule any required interruptions outside of school hours, in coordination with the school principal.

.6 Suppress dust, avoid conditions likely to disperse mould or fungus of any kind, and take steps reasonably necessary to maintain the safety and comfort of the building occupants.

.7 Cease any activity if advised by the school principal, or vice-principal that it is disruptive or offensive to building occupants.

.8 Workers are not permitted to use washrooms, building entrances, or parking areas other than those designated by the School Principal.

.9 Refer to Section 01 35 20 for additional site safety requirements which apply when the building is occupied.

1.21 **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.

1.22 **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.

1.23 **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 Provide prescribed information on any workplace controlled product, including confidential business information, to a doctor or nurse who needs it for diagnosis or emergency medical treatment.

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

1.24 **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.

1.25 **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.

1.26 **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.

1.27 **AIR, VAPOUR, AND THERMAL SEAL**

.1 Ensure that exterior walls, windows, floor and roof surfaces provide an air-tight and vapour-tight membrane to prevent problems due to building vapour migration.

.2 In general, the air/vapour barrier must be achieved on the interior side of the thermal insulation.

.3 The air barrier/vapour retarder membrane, together with flashings and caulking shall provide a complete and continuous air barrier/vapour retardant envelope. All trades must co-ordinate their work with the work of other trades to ensure that the continuity and integrity of the envelope is maintained.

.4 The Owner may require infra red thermal scans of the completed building faces to establish air leakage and thermal deficiencies. Scans will be done by an independent testing agency and paid for out of the Cash Allowances. In the event that the continuity of the exterior envelope has not been maintained the affected areas shall be rectified at no cost to the Owner.

1.28 **SAFETY REQUIREMENTS**

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

1.29 **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 or factors.

1.30 **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 orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience.
.3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Re-testing as described under the Quality Control subsection, below

.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.

1.31 **CASH ALLOWANCES**

.1 Include in the Contract Price, a stipulated sum Cash Allowance in the amount of $**200,000.00**, to be expended as outlined below, which shall apply to the following aspects of the Work:

Authorities Having Jurisdiction (fees, not deposits)
Record Drawings
Concrete Inspection
Building Envelope Inspection and Scanning
Masonry, Mortar, and Grout Testing
Steel Inspection
Steel Deck Inspection
Deflection and Lateral Support Angles Inspection
Roof Inspection
Mineral Fibre Fireproofing and Firestopping Inspection
Window Testing
Hardware Inspection (Third party)
Interior Sign Allowance
Exterior Sign Allowance
Soil Inspection and Testing
Paving Inspection
Topsoil Testing
Additional Video Inspection of Piping, if required
Testing and Balancing
Commissioning
Compaction Testing
Sun Shade Structure (Design, Permitting, General Review (2 site visits)
Sun Shad Structure Construction
Portable Relocation
Portable Relocation (Electrical, Security, Fire Alarm, Communications)
Playground Equipment Testing
Playground Equipment

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

.3 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.

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

.5 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.

.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)

1.32 **WARRANTIES**

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

	# Years
Entire Building, General Contract	**1**
Concrete Floors, Concrete Slabs-on-grade	3
Cavity Wall Insulation	2
Finish Carpentry	2
Architectural Casework	2
Plastic Laminate Work	2
Roofing and Sheet Metal	
- manufacturer's warranty	20
- roofer's warranty	5
Stack Jack Flashings	20
Caulking and Sealants	2
Fibre Cement Siding	
Prefinished Aluminum Panels	2
Prefinished Metal Siding	5
- Finish	20
Hollow Metal Doors, Frames and Screens	3
Wood Doors	3
Finish Hardware	3
Panic Devices and Door Closers	5
Aluminum Windows	5
Sealed Window Units	10
Glass and Glazing	10
Acoustic Ceilings	2
Ceramic Tile	3
Painting	2
Marker Boards	25
Tackboards	2
Coat Racks	2

Window Shades	2
Washroom Accessories	2
Interior Signage	2
Asphalt Paving	2
Synthetic Grass	2
Fences & Gates	5
Sodding	2
Landscaping and Plant Material	2
Septic System	5
Resilient Flooring	5
Carpet Tile	10
LVT	15
Rubber Sheet	15
Shade Structure	2
Tubular Skylight	10

.2 Additional warranties may be noted within the specification sections.

1.33 **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.

1.34 **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 reinspection.

.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. (E.g. Video camera rental to reinspect incorrectly installed sewer lines.)

.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.

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

1.35 **ENVIRONMENTAL DESIGN REQUIREMENTS**

.1 Indoor air quality is of major importance in the building. It is the intention of this Contract that the materials and products used be as low as possible in emissions of volatile organic compounds (VOCs). Low or no VOC products shall be used where these are available and suitable for the application. This is particularly of concern with regard to paints and other finishes, adhesives, sealants, and products manufactured using these materials.

.2 Any cleaners, solvents, fuels, aerosol sprays and other chemical products used during construction should also be low VOC emitting where possible. Provide good ventilation when using any products that may emit VOCs.

1.36 **START-UP**

.1 Commence administrative work upon notice by Owner of award of Contract.

.2 Construction Work cannot commence without a building permit.

1.37 **PAYMENT PROCEDURES**

.1 Refer to CCDC2 2020, Stipulated Price Contract, Part 5, Payment, and amendments thereto included in Division 00, Procurement and Contracting Requirements, subsection 5, Supplementary 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, as-built drawings, and other closeout submittals, as outlined in the applicable specification sections.

.4 Applications for payment shall list HST separately.

1.38 **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.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL PROCEDURES

.1 Changes in the Work ordered by the Consultant in accordance with the General Conditions of the Stipulated Price Contract shall be valued in accordance with the General and Supplementary Conditions of the Stipulated Price Contract 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 Contemplated 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.

.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.

.3 Where a change is not expected to result in an increase or decrease to the scope or cost of work, the Consultant may issue such change as a Jobsite Instruction. Should the Contractor determine that any part of a Jobsite Instruction will result in extra costs, or credits, they shall notify the Consultant, and request the issuance of a Notice of Contemplated Change for the relevant portion of the work. A Jobsite Instruction does not authorize work which will result in a change in the Contract Price.

.4 Standard form of Jobsite Instruction, Notice of Contemplated Change and Change Order may be viewed at the Consultant's office during normal working hours.

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 in triplicate and shall:

.1 List Work proposed to be carried out by Contractor's Own Forces showing labour, material, 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 $3m^3$ and the addition of $4m^3$ of an item, the value of the change will be assessed by applying the net difference of $1m^3$ (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”shall be as defined under the Supplementary Conditions of the Contract and shall include 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 (valued at up to $1,000.00); administrative and supervisory staff; personal vehicles, travel; bonds, insurance; health and safety protocols; and closeout submissions.

.7 Maximum mark-ups for overhead and profit shall be as set out in the Supplementary Conditions of the Contract included in Division 00. The 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.

.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 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.

.10 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 (ie Surveyor) BEFORE the work is hidden.

.11 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.

.12 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

1.1 GENERAL

.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 to products or materials which are proposed by the Contractor during the execution of the Contract are considered "Requests for Substitution". Requests for Substitutions are to be submitted only by the Contractor.

.3 Submit requests for substitutions well in advance of deadlines for ordering specified products. Substitutes will be considered only when submitted in sufficient time to permit proper investigation by the Consultant.

1.2 RELATED WORK

.a Substitution Request Form Section 01 25 05

1.3 REQUESTS FOR SUBSTITUTIONS

.1 Submit a completed Substitution Request Form, accompanied by the information and documentation outlined below, for evaluation by the Consultant.

.2 A Request for Substitution shall include the following information:
- .1 Data sheets for both the specified item and the proposed substitution.
- .2 Complete description of the proposed alternative product or material, including:
  - .1 Laboratory tests results
  - .2 dimensions, gauges, weights, etc.
- .3 Comparison chart outlining the similarities and differences between the specified products and the proposed substitute product.
- .4 An explanation of how the proposed substitute differs from the specified product
  - .1 in physical properties
  - .2 in quality and performance
- .5 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
- .6 Evidence that manufacturers warranties and guarantees for the proposed substitutes are the same, or exceed those required under the Contract.
- .7 Information on the availability of maintenance services and replacement materials for proposed substitute.
- .8 Names, addresses, and phone numbers of fabricators and suppliers for proposed substitute(s).
- .9 References who can attest to the quality of the product..
- .10 Confirmation that the proposed substitution, if accepted, would have no cost impact, or indication of a credit (or extra cost) associated with the substitution.

.3 Submissions of Requests for Substitution must be received by the Consultant well prior to any shop drawing submissions.

.4 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.

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

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

.7 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.

.8 Should the substitution require drawing revisions and/or change documents by the Consultant, fees for this service shall be paid by the Contractor. Hourly rates will be provided to the Contractor upon request.

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

END OF SECTION

Substitution Request No. _____	Date: _____
Specification Title: Specification Section No.:	Subsection/Paragraph:
Description of Proposed Substitute Product or Material:	
Manufacturer: Manufacturer's Local representative: Contact Name: Phone:	Email:
Product History: ☐ < 2 years old ☐ 2-4 years old ☐ 5-10 years old ☐ > 10 years old	
Differences between proposed substitution and specified product:	
Reason for substitution request:	
Affects of Substitution on other Parts of the Work:	

Provide Submittals in accordance with Section 01 25 00 Substitution Procedures.

Attachments:

☐ Product Data Sheets
☐ Written Description
☐ Comparison Chart
☐ Drawings
☐ Samples
☐ Test reports
☐ Written References
☐ _____

References:

Project: _____ Date installed: _____

Address: _____

Owner: _____ Architect: _____

Project: _____ Date installed: _____

Address: _____

Owner: _____ Architect: _____

Total Change to Contract Price: $_____ Credit / Extra

Change to Contract Time: Add / Deduct _____ days

The undersigned agrees that:

- we have thoroughly investigated the products proposed as substitutes and find them to be equal or superior to the specified products in all aspects of quality and suitability to the project;
- the proposed substitution will have no adverse effects on the work of other trades and no additional claims will be made for other work affected by the substitution;
- the proposed substitution does not adversely affect dimensions or required clearances;
- the warranty and availability of maintenance parts/service are equal to or better than for the specified products;
- the dollar amount listed above accounts for all costs associated with the substitution, including material and labour costs for any affected work; and
- should the substitution require drawing revisions and/or change documents by the Consultant, fees for this service will be paid by the Contractor.

Signed: _____ Date: _____

Print Name: _____

Consultant Review:

☐ Accepted ☐ Accepted as noted ☐ Substitution Rejected

Comments:

Signed: _____ Date: _____

Owner Review:

☐ Accepted ☐ Accepted as noted ☐ Substitution Rejected

Signed: _____ Date: _____

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.

.3 The Supervisors must have held the Supervisors position previously on the site of a school project of at least eight million dollars in value.

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

.5 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.

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

.7 Site Supervisor must carry a cell 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.

.8 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 Board's, Consultant's and Contractor's opinion, require clarification.

.7 Exchange names & addresses of all key personnel representing Owner, Consultant, Contractor and Subcontractors.

.8 Identify Consultant's inspection requirements.

1.4 **PROJECT MEETINGS**

.1 Consultant shall Chair project meetings on Site, on a regular basis and will issue minutes to Owner's Representative, Consultants, and Contractor.

.2 Consultant 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

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, cladding, windows, 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.

.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 4 week 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 PHOTOGRAPHS**

.1 Concurrently with monthly application for payment, submit 10 electronic format colour images as follows:

.1 Images shall clearly show overall progress of Work.

.2 Images shall be properly exposed and in focus; views shall be unobstructed. The Consultants will not accept images which are, in their opinion, substandard and these shall be retaken and resubmitted.

.3 Provide an index with printed images clearly identified with name of project, description of view and date taken. Disks are to be clearly labelled .

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. A copy of the report format shall be submitted at least 2 weeks prior to the first progress draw, for review. 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

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 Mechanical Trades (Divisions 21, 22, 23 and 25) and Electrical Trades (Division 26).

.6 Permits for temporary structures, hoists, etc.

.7 Schedule of Values: Refer to General 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 Submit preconstruction and progress surveys, required under Section 01 71 23, Field Engineering.

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

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

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

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

.7 As-Built Documents:

.1 The Owner requires as-built documents for all architectural, structural, mechanical, electrical, and site services changes on completion of the construction.

.2 The Contractor shall obtain, from the Consultant, 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 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 Depth of various elements of foundation in relation to first floor level if different from contract documents.

.2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.

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

.4 Field changes of dimension and detail.

.5 Changes made by Change Order or Jobsite Instructions.

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

.11 Refer to Mechanical, Electrical, and Site Servicing Specification Divisions for more specific requirements regarding preparation and submission of final Record Drawings. Refer to Section 01 78 00 for valuation of closeout submittals.

.12 Provide final, as-built, topographical survey, as specified in Section 01 71 23, Field Engineering.

.13 Submission of these completed documents shall be a condition precedent to the issuance of Consultant's final payment certificate.

END OF SECTION

PART 1 - GENERAL

1.1 SCHEDULE

.1 Within 5 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 and a minimum of ten (10) working days 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 name of reviewer.

.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. Refer to Section 01 10 00, General Instructions, for the process for requesting approval of 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. These include:
.1 structural steel
.2 steel joists
.3 reinforcing steel
.4 loadbearing metal stud framing
.5 metal fabrications
.6 steel siding
.7 hollow metal screens
.8 aluminum widows
.9 retaining walls
.10 mechanical and electrical equipment - structural supports
.11 site services structure
.12 septic system
.13 concrete sheds / shade structures
.14 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 Submit two (2) to five (5) copies of printed shop drawings as follows:

.1 Submissions shall be in sufficient quantities for distribution to all reviewers, plus one copy to be returned to the Contractor for reproduction and distribution.

.2 The prime Consultant requires one copy of every submission, of all disciplines.

.3 Each sub-consultant, of each discipline, will retain one copy of the shop drawings. Where one sub-consultant is responsible for the review of more than one discipline, they will require multiple copies, as applicable.

.4 For architectural submissions which do not need to be reviewed by sub-consultants, only two copies are required.

.5 Refer to sections prepared by the sub-consultants for possible variations on these requirements.

.8 Email Submission:

.1 Submittals that are formatted for 11" x 17" (279 x 432mm) sheets or smaller may be submitted by email, provided the total number of pages, for the entire submission, does not exceed 15.

.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 the Consultant.

.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.

.9 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.

.10 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.

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

.12 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.

.13 Shop Drawings are required for the following items:

Building Layout
Concrete and Masonry Reinforcement
Masonry Anchorage and Reinforcement
Structural Steel
Steel Joists
Metal Deck
Architectural Metals
Woodwork and Casework
Metal Siding
Fibre Cement Siding
Roof Assembly
Tapered Insulation
Roof Accessories
Wood Doors
Hollow Metal Work
Windows
Hardware Schedule and Data
Acoustic Ceilings
Resilient Flooring
Acoustic Panels
Concrete Sheds
Shade Structure
Manufactured Specialties
Visual Display Boards
Integrated Smart Boards
Washroom Accessories
Coat Racks
Shades
Synthetic Grass Surfacing
Fences and Gates
Boulders / Retaining Walls
Septic System

Mechanical and Electrical Equipment as listed in those specification sections
Other items as may be requested within the specifications

.14 Refer also to the General Conditions of the Contract and Division 00, subsection 5, Supplementary Conditions.

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.

.5 Construct each sample or mock-up complete, including work of all trades required to finish work.

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

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

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

1.6 **MOCK-UP CLASSROOM**

.1 A typical classroom, selected by the Contractor, shall be finished out as soon as the drywall work has begun inside the building.

.2 Classroom shall be complete with all finishes and devices including lights, electrical outlets and devices including faceplates, P.A. device, thermostats, marker boards and tackboards. Walls shall be painted and ceiling, floor and base in place. The mock-up of typical installation must be approved by the consultant prior to commencement of finished trades in other classrooms.

1.7 **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.

1.8 **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 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.

.7 The Architect will use the following stamps in reviewing Shop Drawings:

Date:

RECEIVED

MOFFET & DUNCAN ARCHITECTS INC.

"Review by Moffet & Duncan Architects Inc. does not in any way constitute review of the design of engineering elements, which form part of the Contract Documents prepared by others."

MOFFET & DUNCAN ARCHITECTS INC.

REVIEWED	☐
REVIEWED AS NOTED	☐
REVISE AND RESUBMIT	☐

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

MOFFET & DUNCAN ARCHITECTS INC.

REVIEWED BY	
DATE	
PROJECT No.	

END OF SECTION

PART 1 - GENERAL

1.1 CONSTRUCTION SAFETY

.1 Observe and enforce construction safety measures required by the National Building Code of Canada, 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. The items listed below are only guidelines of the Owner's expectations in this regard and not to be construed to be comprehensive or total in nature.

.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 students, 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 defence 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 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 Maintain fire safety in the existing building during construction, as follows:

.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 and 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 Cover existing windows exposed to construction with 16mm gypsum board on steel stud framing, on interior side of such windows. Louvres shall be similarly protected. Replace doors exposed to construction with hollow metal doors.

.6 Where temporary openings are made in existing floors, pack with mineral wool insulation to create temporary fire barrier.

.7 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.

.8 Refer to the Ontario Fire Code for requirements for temporary shutdown of fire protections systems, including sprinklers and standpipe systems.

.9 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 and safety vests for use by all visitors.

1.8 **ADDITIONAL REQUIREMENTS FOR OCCUPIED SITES**

.1 The existing school will be occupied throughout the academic year. When school is in session, additional safety requirements will apply, as outlined below:

.2 Flagman:

.1 Provide a full-time flagman at each vehicular construction entrance.

.2 The location of the Flagman shall be coordinated with the Owner, to ensure the safe guarding of staff, students, and the general public.

.3 Flagman shall be a designated person, not the Site Supervisor or other construction worker, and shall not be changed during the Project unless approved by the Owner.

.4 Flagman must have means of communication with Site Supervisor (phone or walkie-talkie).

.5 Flagman shall meet and escort all construction traffic from the site **entrance** into and out of the fenced construction area, from street through entrances to hoarding. No unaccompanied construction vehicles will be permitted on School Board property, outside of construction enclosure.

.6 Flagman shall control construction parking at the school site. Parking shall be as designated by Owner and school Principal.

.7 Contractor may provide a temporary shelter for the flagman, if necessary or desired, the cost of which shall be included in the Tender Price.

.8 Flagman shall be properly outfitted to carry out his duties, with appropriate safety clothing and equipment, including reflective vest, hand-held "Stop" sign and a visible identification tag.

.3 Access Control:

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

.2 Site Supervisor shall then advise the flagman to meet and escort the vehicle.

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

.4 Site Communication

.1 The Contractor shall provide the Owner and Principal 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 school Principal to determine any activities which may involve safety concerns, whether school 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

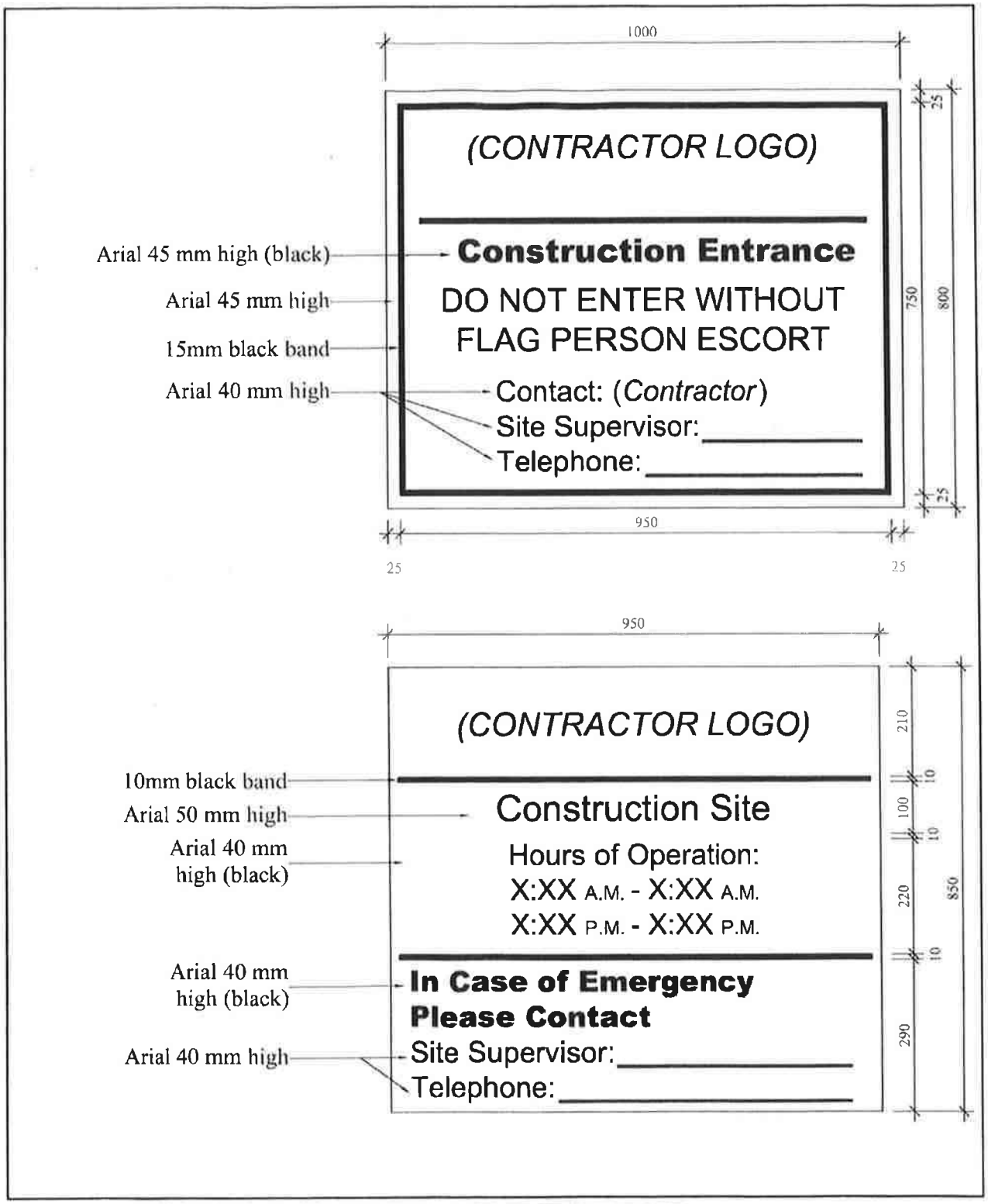
.2 During the school year, signage posted at gates shall state restrictions on hours of entry and egress, as agreed to by the Owner and Principal, and under no circumstances shall construction traffic be allowed within 30 minutes prior to school start, during recess, lunch break, and within 30 minutes after school dismissal.

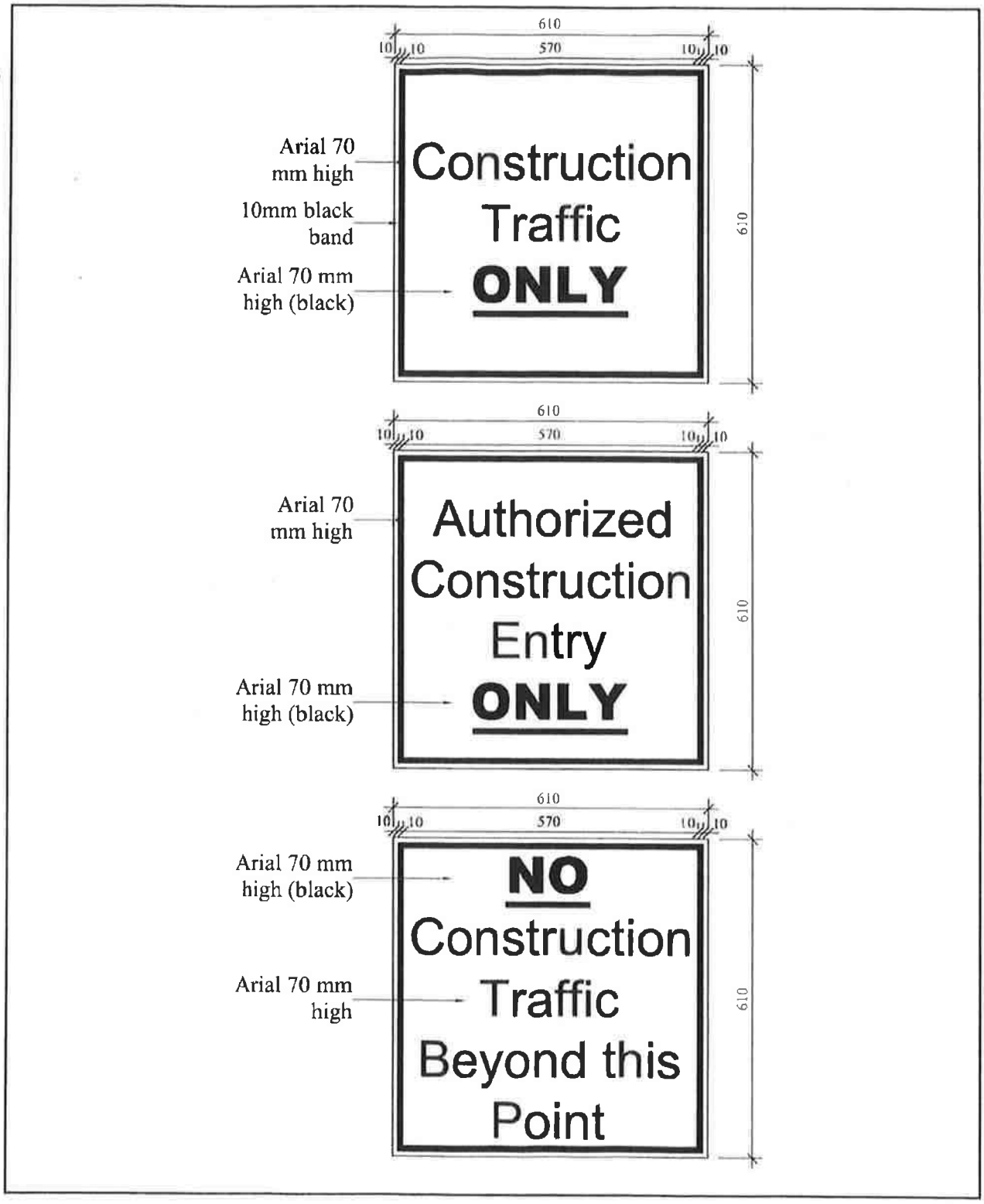
1.10 **PANDEMIC RESPONSE MEASURES**

.1 When pandemic response measures are indicated by provincial and/or municipal authorities, abide by all restrictions and protocols.

.2 Refer to Section 01 10 00 for COVID-19 response measures required

END OF SECTION


1000
25
(CONTRACTOR LOGO)
Arial 45 mm high (black)
Construction Entrance
Arial 45 mm high
DO NOT ENTER WITHOUT
FLAG PERSON ESCORT
15mm black band
Arial 40 mm high
Contact: (Contractor)
Site Supervisor:
Telephone:
750
800
25
950
25
25
950
(CONTRACTOR LOGO)
210
10mm black band
10
Arial 50 mm high
Construction Site
100
10
Arial 40 mm high (black)
Hours of Operation:
X:XX A.M. - X:XX A.M.
X:XX P.M. - X:XX P.M.
220
850
10
Arial 40 mm high (black)
In Case of Emergency
Please Contact
Arial 40 mm high
Site Supervisor:
Telephone:
290


610
10
10
570
10
10
610
Arial 70 mm high
10mm black band
Arial 70 mm high (black)
Construction
Traffic
ONLY
610
10
10
570
10
10
610
Arial 70 mm high
Arial 70 mm high (black)
Authorized
Construction
Entry
ONLY
610
10
10
570
10
10
610
Arial 70 mm high (black)
Arial 70 mm high
NO
Construction
Traffic
Beyond this
Point

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 The Owner commissioned a survey of hazardous building materials and identified asbestos and other hazardous materials in the building; refer to the Hazardous Materials Report included in the Supplementary Information Volume.

.1 Abatement of hazardous materials is to be carried out under this Contract by a prequalified Abatement Contractor.

.2 The cost of abatement work shall be included in the Tender price / bid amount.

.3 Additional abatement work not identified in the Tender documents shall be paid for through the Cash Allowances.

.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 Remove, transport, and dispose of hazardous materials in accordance with applicable laws, including the following:

.1 Occupational Health and Safety Act, R.S.O. 1990, c. O.1., including the following regulations made under the Act:
.1 O.Reg. 213/91, Construction Projects, amended to 345/15 and
.2 O.Reg. 278/05, Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations amended 479/10.

.2 Regulations for the transport of asbestos waste, including:
.1 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
.2 Dangerous Goods Transportation Act, R.S.O. 1990, c. D.1

.3 Environmental Protection Act, R.S.O. 1990, C. E.19, and regulations under the Act, including:
.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 R.R.O. 1990, Reg. 347: General - Waste Management

.5 Where a friable building material is found 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.

.6 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.

END OF SECTION

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 PERMITS AND DEPOSITS

.1 The Owner will obtain and pay for the building permit and provide securities required of the Owner under the Site Plan Agreement.

.2 The Contractor shall obtain and pay for permits required for the performance of the Work, which include the following:
- .1 Road Occupancy Permit if required.
- .2 Permits required for mechanical and electrical work.
- .3 Ministry of Environment permit for septic system work.

.3 The Contractor will be responsible for all deposits required by Authorities Having Jurisdiction, as required to carry out the Work of the Contract.
- .1 The Contractor will be responsible for all submissions required by such Authorities for the release of all securities, including securities paid by the Owner which are based on their performance of the Work for which the securities are held.
- .2 Submittals for release of securities shall be in the form prescribed by the relevant Authorities.

1.3 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 Geotechnical testing and inspection reports confirming bearing capacity of soils

.4 Consultant's and engineers' letters confirming project is ready for occupancy in accordance with the provisions of the Ontario Building Code, Division C, section 1.3.3, Occupancy of Buildings.

.5 Structural steel inspection reports certifying conformance to CSA Standards S16, S136 and A660.

.6 Concrete testing reports and inspection reports for reinforcing steel.

.7 Roof inspection reports.

.8 Verification of compliance with tested designs for rated assemblies.

.9 Verification of Fire Protection Systems including:
- .1 Verification of engineer supervised sprinkler, standpipe and hose system testing.
- .2 Material and test certificates for all work, including below ground, in conformance with NFPA-13 and NFPA-14, as applicable.

.10 Verification of Fire Alarm System as follows:
- .1 Testing to CAN/ULC S537
- .2 Installation to CAN/ULC S524
- .3 Monitoring to CAN/ULC S561

.11 Septic system commissioning / decommissioning reports.

.12 Additional documents as required by the municipality.

1.4 SUBMITTALS REQUIRED BY MUNICIPALITY, REGION AND PROVINCIAL AUTHORITIES

.1 Provide submittals required by the municipal and regional authorities for work on public roadways. Confirm requirements of site plan agreement and site servicing agreement with Consultant.

.2 Submittals required during the construction period typically include the following, which should be considered the minimum requirements:
- .1 Certificate of Insurance.
- .2 Notice of intention to commence construction, 5 business days prior to start
- .3 Construction schedule for construction of municipal and regional services.
- .4 Survey by OLS confirming building levels and locations, with certification, submitted to city prior to building construction (Spec Section 01 71 23, 1.2.5).

.5 Geotechnical field reports, from P.Eng, verifying adequate bearing capacity and permanent groundwater level, prior to pouring of concrete footings.
.6 Application to designate fire route.
.7 Field review reports for retaining walls, from P.Eng.
.8 Material and compaction testing reports, from P.Eng., for all paving, curbs, and sidewalks on municipal and regional property.

.3 Provide septic system commissioning, septic system and water well decommissioning reports to provincial and local authoritis.

.4 For Submittals required upon completion of the Work, refer to Section 01 78 00, Closeout Submittals.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section describes typical 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.

1.2 LIST OF ABBREVIATIONS

A	
AB	Air Barrier
A/B	Anchor Bolt
AC	Air Conditioning
ACT	Acoustic Ceiling Tile
ADD	Addendum
ADJ	Adjustable
AFF	Above Finished Floor
AFG	Above Finished Grade
AG	Acoustic Glazing
AHU	Air Handling Unit
ALM	Alarm
ALUM	Aluminum
AMP	Ampere
ANN	Annunciator Panel
ANO	Anodized
AODA	Accessibility for Ontarians with Disabilities Act
APPROX	Approximate
AUTO	Automatic
A/V	Audio Visual or Air/Vapour
AVB	Air/vapour Barrier
AWT	Acoustic Wall Treatment
AWU	Acoustic Wall Unit

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
BTU	British Thermal Unit
BUR	Built-up Roofing
BV	Block Vent or Brick Vent

C

°C	Degrees Celsius
CAB	Cabinet
CAP	Cementitious Acoustic Panel
CAR	Carpet
CB	Chalkboard, or Catchbasin
C/B	Catchbasin
CBMH	Catchbasin Manhole
C/C	Centre to Centre
CEC	Canadian Electrical Code
CEM	Cement
CER	Ceramic
CGA	Canadian Gas Association
CH	Coat Hook
CJ	Control Joint
CL	Centre Line
CLF	Chain Link Fence
CLG	Ceiling
CLR	Clear
CMU	Concrete Masonry Unit
COL	Column
CONC	Concrete
CONSTR	Construction
CONT	Continuous
CONTR	Contract or Contractor
CONV	Convector
CORR	Corridor
CP	Control Panel
CPT	Carpet
CR	Coat Rack
CS	Convenience Shelf
CSA	Canadian Standards Association
C/S	Concrete, Sealed
CSF	Cushioned Sheet Flooring
CT	Ceramic Tile
cUL	UL Certified for Canada
CTR	Centre
CV	Condom Vendor
CW	Curtain Wall
CW1	Curtain Wall Type 1, etc.
C/W	Complete with
CWT	Ceramic Wall Tile

D

DAMP	Dampproofing
DAT	Datum
DBL	Double
DEMO	Demolish or Demolition
DET	Detail
DEW	Dry Erase Wallcovering
DF	Drinking Fountain
DEFIB	Defibrillator
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 or Exhaust Fan
EC	Emergency Call
ECS	Emergency Call Signal
EJ	Expansion Joint
EL	Elevation
ELEC	Electrical
ELEV	Elevator
EQL	Equal
EQ/T	Equivalent Thickness
EQPT	Equipment
EW	Emergency Eye Wash
EX	Existing
EXH	Exhaust
EXP	Expansion
EXP STR	Exposed Structure

F

F1	Frame Type 1, etc.
FA	Fire Alarm
FARA	Fall Arrest Roof Anchor
FB	Fire Blanket
FBD	Fibreboard
FD	Floor Drain
F/D	Fire Damper
FDC	Fire Department Connection
FDN	Foundation
FE	Fire Extinguisher
FEC	Fire Extinguisher Cabinet
FFL	Finish Floor Level
F.G.	Fixed Glass
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
FRG	Fire Rated Glass
FRR	Fire Resistance Rating
FS	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
HC	Handicapped
HD	Hand Dryer or Heavy Duty
HM	Hollow Metal
HOD	Hold Open Device
HP	Horsepower
HR	Hour
HRD	Hair Dryer
HTD	High Traffic Doors
HVAC	Heating, Ventilation and Airconditioning
HWT	Hot Water Tank
HYD	Fire Hydrant

I

ID	Inside Diameter
IGU	Insulating Glazing Unit
INS	Insulation
INSUL	Insulate
ISOL	Isolation

J

JB	Junction Box

K

KG	Kilogram
kPA	Kilopascal

L

LAB	Laboratory
LAM	Laminate
LAT	Lay-in Acoustical Tile
LAT-1	Lay-in Acoustical Tile (Type 1)
LAV	Lavatory
LB	Pounds
LBL	Label
LDBR	Load Bearing
LDG	Landing
LED	Light Emitting Diode
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
L/S	Litres per Second
LSA	Lateral Support Angles
LVL	Level
LV-1	Louvre (Type 1)
LWB	Light Weight Block
LWC	Linear Wood Ceiling

M

M	Metres
M1	Mirror Type 1 or Masonry Type 1, etc.
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
MOD BIT	Modified Bituminous
MR	Moisture Resistant
MTD	Mounted
MUL	Mullion
MWP	Membrane Waterproofing

N

NAT	Natural
NBCC	National Building Code of Canada
NEMA	National Electrical Manufacturers Association
NFHB	Non-freeze Hose Bibb
NFPA	National Fire Protection Association
NIC	Not in Contract
NO.	Number
NOM	Nominal
NSF	National Sanitation Foundation
NTS	Not to Scale

O

OA	Overall
OBC	Ontario Building Code
OC	On Centre
OD	Outside Diameter
O/H	Overhead
OHS	Overhead Stop
OWSJ	Open Web Steel Joist
OV	Oven

P

P	Paint
PAP	Prefinished Aluminum Panel
PA	Public Address System
PAR	Parallel
PB	Push Button (Door Operator)
PBD	Particleboard
PC	Precast Concrete
PE	Porcelain Enamel
PER.	Perimeter
PERF	Perforated
PERIM	Perimeter
PERP	Perpendicular
PFG	Patterned Fritted Glass
PG	Plate Glass
PH	Phase or Potential of Hydrogen
PL	Plaster
PLAM	Plastic Laminate (also P.LAM.)
PLUMB	Plumbing
PLWP	Plastic Laminated Wall Panelling
PLYWD	Plywood
PMF	Prefinished Metal Flashing
PMS	Prefinished Metal Siding
PMP	Prefinished Metal Panel
PNL	Panel
POLY	Polyethylene or Polyolefin
PR	Pair
PREFIN	Prefinished
PRELIM	Preliminary
PSI	Pounds per Square Inch
PT	Porcelain Tile, or Paint
PTD	Paper Towel Dispenser
PTN	Partition
PTW	Preservative Treated Wood
PVC	Poly Vinyl Chloride
PVG	Paving
PWC	Plastic Wall Covering

Q

QT	Quarry Tile

R

R	Radius
RA	Return Air or Roof Anchor
RAD	Radiator
RB	Rubber Base
RCP	Reflected Ceiling Plan
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 or Removable
RES	Resilient
REV	Revise / Revision
RFG	Roofing
RFS	Room Finish Shedule
RH	Right Hand
R/H	Roof Hopper
RLG	Railing
RM	Room, or Recess Mounted
RMC	Reinforced Masonry Column
RSF	Resilient Sheet Flooring
RPF	Resilient Plank Flooring
RUBB	Rubber
RUH	Recessed Unit Heater
RWL	Rainwater Leader

S	
S-1	Stain (Type) 1
SAD	Security Alarm Device
SAN	Sanitary
SC	Security Contact or Solid Core
SCH	Safety Coat Hook
SCHED	Schedule
SD	Soap Dispenser
SEC	Special Epoxy Coating
SF	Safety Flooring
SIM	Similar
SK	Sink
SL	Slate
SND	Sanitary Napkin Disposal
SNV	Sanitary Napkin Dispenser
SOG	Slab on Grade
SP	Spandrel Panel
SPEC	Specifications
SPC	Special Coating
SPF	Sports Flooring
SPKR	Speaker
SQ	Square
SRCONV	Semi Recessed Convector
SRF	Slip Resistant Flooring
S.S.	Stainless Steel
ST	Steel
ST.ST.	Stainless Steel
STAG	Staggered
STC	Sound Transmission Class
STD	Standard
STIFF	Stiffener
STOR	Storage
STRUC	Structure or Structural
SU	Storage Unit
SUPPL	Supplement/al
SURF	Surface
SUSP	Suspended
SVF	Sheet Vinyl Flooring
SW	Sidewalk
SWF	Special Wall Finish
SYM	Symbol

T	
TB	Tackboard
T&B	Top and Bottom
TBD	To Be Determined
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 or Tempered
TH	Test Hole
TM	Tilted Mirror
T/O	Top of
TOC	Top of Curb
TOCS	Top of Concrete Slab
TOS	Top of Steel
TPD	Toilet Paper Dispenser
TPG	Tempered Plate Glass
TR	Transom
TYP	Typical

U	
U/C	Undercut
U/G	Underground
UH	Unit Heater
UL	Underwriter's Laboratories
ULC	Underwriter's Laboratories of Canada
UNEX	Unexcavated
UNF	Unfinished
UNO	Unless Noted Otherwise
U/P	Unpainted
UU	Urinal
U/S	Underside
UTIL	Utility

V	
V	Volts
VAR	Variable, Varies
VB	Vapour Barrier
VCT	Vinyl Composition Tile
VERT	Vertical
VEST	Vestibule
VF	Vinyl Faced
VR	Vapour Retarder
VT	Vinyl Tile
VWP	Vinyl Wall Panel

W

W1	Window Type 1, etc.
W/	With
WAP	Wood Acoustic Panel
WASH	Washing Machine
WB	White Board
WC	Watercloset (Toilet)
WD	Wood
WDF	Wood Flooring
WEF	Waterproof Elastomeric Flooring
WF	Wash Fountain
WG	Wired Glass
W/O	Without
WP	Waterproofing, Working Point
WR	Washroom
W/R	Water Resistant
WSF	Wood Sports Flooring

END OF SECTION

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 them reasonable opportunity to review the work for compliance with contract requirements. Failure to meet this requirement may be cause for the Consultant to classify the work as defective or require that the work be uncovered to permit review.

.2 Notify Consultant when mock-ups are ready for review. Do not proceed with the applicable work until mock-up has been reviewed and accepted by the Consultant.

.3 Notify Subconsultants directly when work of their discipline is ready for review. Do not cover new work without providing consultants the opportunity to review work outlined in the documents prepared by their firms.

.4 Notify testing and inspection companies when applicable work is ready for their inspection and/or testing. Inspection and testing requirements are listed in applicable specification sections. Refer also to Section 01 10 00, General Instructions.

1.3 INSPECTION AND TESTING

.1 The Owner will appoint Inspection and Testing Agents to perform inspections, test materials, and provide reports to all parties. Payment will be though the Cash Allowance included in the Contract. Refer to Section 01 10 00.

.2 Testing and inspection will be as outlined in the applicable specifications sections, and generally as outlined below.

.3 Geotechnical Inspection and Testing:

- .1 Compaction Testing: subgrade, backfill, engineered fill, base and sub-courses at hard surface paving, bedding and backfill at service trenches, etc.
- .2 Erosion and Sediment Control Inspection
- .3 Soil Testing
- .4 Asphalt Mix Review, Inspection, and Testing

.4 Building Structure and Material Inspection and Testing:
- .1 Concrete Testing and Inspection
- .2 Concrete mix design
- .3 Masonry Unit Testing
- .4 Mortar and Grout Testing
- .5 Steel Inspection
- .6 Steel Deck Inspection
- .7 Deflection and Lateral Support Angles Inspection
- .8 Firestopping & Fireproofing Inspection
- .9 Hollow Metal Doors, Frames, Screens Testing and Inspection

.5 Building Envelope Inspection and Testing:
- .1 Air Barrier/ Vapour Retarder Inspection
- .2 Roof Inspection
- .3 Cut Test of Roof (if required)
- .4 Building Envelope Thermal Scanning
- .5 Infrared Scanning of Roof
- .6 Window Testing

.6 Inspection and testing for Site Services, Septic System, Mechanical Work, and Electrical Work is generally included in Contract. Coordinate to ensure all required testing and inspection is carried out in a timely manner and results reported promptly to Consultant and Owner. Additional testing requested by the Owner or Authorities Having Jurisdiction will be paid through the Cash Allowance.

1.4 DEFECTIVE MATERIALS AND WORKMANSHIP

.1 Where testing and inspection reports reveal work not in accordance with Contract requirements, the Contractor shall pay costs for additional tests or inspections as Consultant may require to verify acceptability of corrected work.

.2 Where factual evidence exists that defective workmanship has occurred or that work has been carried out incorporating defective materials, the Consultant may order 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.

.1 Tests, inspections or surveys carried out under these circumstances will be undertaken 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, give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards cited by the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 TEMPORARY TELEPHONE AND COMMUNICATIONS

.1 Install and pay for all communications services on site, including telephone, internet, computer, and printer for Contractor's own use, and for the Owner's and Consultant's use.

.2 Refer also to Section 01 52 00, Construction Facilities.

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 Provide an adequate pure fresh water supply for the use of trades. Run supply pipe from nearest available source and maintain in good condition until the permanent system is installed and ready for use.

.3 Ensure continued water and power supply to adjacent residences and buildings throughout the construction period. Arrange for temporary services, including approvals from authorities having jurisdiction, where any interruption is anticipated.

.4 Power and water is available from existing school. Use shall be co-ordinated with custodian and must not interfere with school operation.

1.3 TEMPORARY HEATING AND VENTILATION

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

.2 Provide for the proper heating and drying out of the work during construction, until the completion of the heating system, by the use of approved propane portable heating equipment. Assume full responsibility for damage caused by temporary heating equipment, such as smoke, or overheating. Furnish all equipment labour and fuel to protect all work and maintain the building at not less than 10°C. The use of Salamanders or other open flame type heaters will not be permitted.

.3 When the building or part thereof is temporarily enclosed, provide sufficient temporary piping and temporary unit heaters or radiators or other suitable heating equipment to maintain all parts of the enclosed work at not less than 15°C. or higher if required by any finishing trade. Maintain strict supervision of operation of temporary heating and ventilating equipment. The Contractor shall be fully responsible for damage caused by temporary heating equipment, such as smoke or overheating.

.4 When building or part of building is enclosed and heated, maintain sufficient ventilation to prevent build up of moisture and condensation, to enable the work of the finishing trades to be correctly applied. Provide adequate ventilation during and after operation involving materials or processes involving potentially harmful fumes or orders.

.5 When the building is enclosed with permanent construction, the heating system installed under this contract may be used for temporary heating, subject to the Owner's approval, provided that:

.1 Written approval for such use has been obtained from the Owner.

.2 The areas to be heated are closed at all times.

.3 Temporary use of the permanent heating system shall be carried out under the direction of the Heating Trade who shall be fully responsible for the safety of the system and its operation including provision of trained operators.

.4 The system shall be handed over in perfect condition and where necessary be overhauled to be in new condition.

.5 The Contractor pays operation costs and all costs incurred by compliance with these provisions.

.6 At completion of work, thoroughly clean equipment and system, replace all filters, and service all components, so that all guaranties and warranties on the equipment and systems used shall remain in effect for a minimum of one year from the date of Substantial Performance of the Work.

.6 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.

.7 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 and solvents in secure, locked, ventilated room at all times.

.8 Upon completion of the work, the heating equipment and system shall be thoroughly cleaned, tested and put into operation and turned over to the Owner in perfect condition; after approval by the Consultant and their Consulting Engineers. All warranties must be valid from date of Substantial Performance of the Contract, except in the case of partial occupancy where it shall be date of occupancy.

.9 All concrete, masonry and finish shall be protected from frost during construction by temporary enclosures and heating or by other methods approved by the Consultant. The Contractor shall be solely responsible for damage to work through lack of adequate heating or protection and for smoke damage.

.10 Activate ventilation system under direction of Consultant to provide temporary heat and ventilation, when Consultant is satisfied that system will not be damaged by freezing. Protect ducting system with filters, inspect daily and replace weekly or more frequently as necessary. Finally vacuum clean entire ducting system and renew or replace all filters on substantial completion.

.11 Maintain strict supervision of operation of temporary heating and ventilating equipment.

.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 **REMOVAL OF TEMPORARY UTILITIES**

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

1.5 **FIRE EXTINGUISHERS**

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

1.6 **FIRE SEPARATION & HOARDING**

.1 Construct fire rated fire separation and hoarding between existing school and addition and at temporary corridors where indicated on drawings. Make allowances for fire stopping around existing ductwork, piping. conduit and structure above ceilings to underside of roof deck.

.2 Fire separation shall extend from floor to underside of steel deck.

.3 Construct hoarding out of 92mm steel studs and two layers of 16mm type 'X' gypsum board (each side of studs).

.4 Fill partition with acoustic batt insulation and firestop around all openings.

END OF SECTION

PART 1 - GENERAL

1.1 CONTRACTOR'S SITE OFFICE

.1 Provide and maintain a site office heated to 22°C, lighted 750 Lx and ventilated, of sufficient size to accommodate 15 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 and computer or other acceptable means of communication as noted below.
- .6 Printer/copier.

.3 Mobile telephone will only be accepted in place of site telephone if 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 multi-function fax machine may be accepted in lieu of a computer, printer, and copier on site, subject to acceptance of provisions by Owner and Consultant.

.5 Locate site office 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 testing 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 approved of the Consultant.

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

1.3 **SANITARY FACILITIES**

.1 Furnish and maintain in a sanitary condition, suitable painted building containing adequate sanitary accommodation for all workmen in accordance with local Municipal and Provincial sanitary regulations, and to the approval of Public Health Authorities and the Consultant, with all necessary water, sewage, light and heat supplied in sufficient quantity. The use of single portable serviced units will be permitted providing siting is approved.

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

.3 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

PART 1 - GENERAL

1.1 SITE ENCLOSURE

.1 Install temporary fencing at start of mobilization to fully secure site. No construction work or excavation work may be undertaken on an unsecured site.

.2 Provide site enclosures to accommodate phasing as indicated on drawings.

.3 Enclose site to conform with current legislation and safety standards. Provide temporary 1.8m high galvanized chainlink fencing around entire construction site, complete with gates as required for site access. Fencing shall remain throughout construction period and until all construction debris has been removed from site. Gates shall be locked when no work is in progress.

.4 For temporary fencing all posts, other than gate posts, shall be driven in minimum 1.5m, at maximum 3048mm spacing. Gate posts shall be set in concrete. Secure temporary fencing to new fences where they meet.

.5 Erect enclosure so as to provide a secure compound for construction equipment & supplies. Hold the Owner harmless from any damage or expense arising from failure to properly execute such work.

.6 Provide, erect, and maintain hoarding for construction as required for safety or as otherwise agreed to with the Consultant, or as directed by Authorities Having Jurisdiction. Confirm that hoarding is designed to resist wind loads.

.7 Gates to be kept locked except during working hours.

.8 Maintain hoarding during the period of the Contract.

.9 Should the project be stopped for any reason, provide and maintain all necessary fencing and protection to protect building & site from damage.

.10 On completion of the contract, take down and remove hoarding and gates from the site as well as the plywood hoarding enclosures at the drip line of all trees that are to remain.

1.2 DRAINAGE

.1 In Phase 2 of the work, the existing storm water system at the west end of the site will be removed. Installation of new storm system in area will commence later in Phase 2, but will not be completed until Phase 3. Provide new 150mm Ø weeping tile in west end of school and outlet to north play field, or provide pumping. Refer to Phasing drawings.

.2 Provide temporary outlet of new storm system during Phase 2 while new system is partially compete. Refer to Civil Phasing drawings.

.3 Provide temporary drainage and pumping as necessary to keep excavations and Site free from water.

.4 Pumping of water containing silt in suspension into waterways, sewer or drainage systems is prohibited.

.5 Dispose of water containing silt in suspension in accordance with local authority requirements. Silt fencing is required to contain silt on site.

.6 Take full responsibility for maintenance of existing drainage, above ground and underground, adjacent to the Work or affected by the Work.

.7 Before commencing any Work likely to affect the drainage of water from the Site, provide necessary alternative drainage systems to ensure that water will be conducted to alternative outlets. Do not block or impede any drain, roof outlet or rainwater leader until such safety precautions have been made.

1.3 **SILT CONTROL**

.1 Maintain silt control to prevent silt migration into water courses, storm sewers and adjacent properties.

.2 Provide, install, and maintain any additional silt fencing required by the Municipality to control run off from work area.

1.4 **TREE PROTECTION**

.1 Protect all existing trees from damage during the construction period. Protection to be in accordance with municipal standards and approvals.

.2 Confine movement of heavy equipment, storage of same, and storage of materials to a predetermined area. Do not store materials or place equipment over root systems of any existing trees.

.3 No rigging cables shall be wrapped around or installed in trees. Do not flush concrete trucks or cement mixing machines over root systems or near trees. Flush concrete trucks or cement mixing machines in areas approved by Consultant.

.4 Protect plant and root systems from damage, compaction and contamination resulting from construction by erecting hoarding fence at the dripline of existing vegetation to be preserved to the satisfaction of Consultant.

.5 Where root systems of trees are exposed directly adjacent to a structure backfill with good loam only.

.6 If any existing tree to remain is injured and does not survive the following year, replace with a tree of similar size and value, as directed by the Consultant, at no additional cost to Owner.

.7 Should the destroyed tree be of such a size or shape that it cannot be feasibly replaced, then the Contractor shall compensate the owner for the minimum sum of one thousand dollars ($1,000.00) per destroyed tree.

.8 Identify plants, condition of plants, and limits of root systems to be preserved to satisfaction of Consultant. Report any discrepancy in plant condition and preservation status prior to any removal.

.9 Install hoarding in conformity with details, including 2000 mm length metal T-bars at 2400mm on centre, 100 dia corner posts, 38 x 90 top rail and braces. Attach fence to frame and fasten with wire fasteners.

.10 From time of acceptance by Consultant to end of warranty period, perform following maintenance operations:

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 Apply biological controls in accordance with Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain project approval from Consultant prior to application.

.3 Apply organic urea fertilizer in early spring at suppliers suggested rate.

.4 Remove dead, broken or hazardous branches from plant material.

.5 Submit monthly written reports to Consultant identifying:
.1 Maintenance work carried out
.2 Development and condition of plant material
.3 Preventative or corrective measures required which are outside Contractor's responsibility

.6 Prune crown to compensate for root loss while maintaining general form and character of plant.

1.5 **SITE PROTECTION**

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

.2 Provide mud matts at site entrances, to avoid mud tracking on to roadways by construction vehicles. Conform to municipal standards and pay any related deposits required by the City.

.3 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. Provide and maintain temporary fencing at excavations, etc. as required for safety. Protect existing asphalt and concrete paving and curbs from damage and make good any damage at completion of project.

.4 Protect footings, masonry, mortar, concrete, and all frost susceptible materials from cold weather and rain. Protect all of the work from damage by the elements.

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

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

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

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

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

.10 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.

.11 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.

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

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

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

.15 The Contractor is responsible for snow removal on sidewalks adjacent to work areas and all are as required for access to site.

.16 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.

1.6 **TEMPORARY DRIVEWAY ACCESS**

.1 Ensure continuous access to all existing driveways from municipal and regional roads. Provide steel plates as required to bridge all excavations, trenches, and other site disturbances at driveway locations. All work to be coordinated with Principal / Owner.

.2 All work to conform to municipal and regional standards.

1.7 **PROTECTION DURING WINTER**

.1 The Contractor shall protect footings and other concrete and all other work from frost by methods approved by the Consultant to ensure that continuous or uninterrupted construction may be carried out throughout the winter from date of award of Contract, to completion of same. The Contractor shall be solely responsible for the damage to work through lack of adequate heating or protection.

1.8 **MAINTAINING INDOOR AIR QUALITY**

.1 Smoking is not permitted inside the building or on the school property at any time. The Contractor shall post "No Smoking" signs throughout the work areas to enforce this requirement.

.2 Minimize the time that vehicles are left idling on site. Keep idling vehicles away from open doorways and windows, open areas of the building, fresh air intakes, and areas where people are gathered.

.3 All adhesives, sealants, paints and coatings applied onsite must be low VOC products.

.4 Products requiring the use of adhesives, sealants, paints and other coatings, are to be assembled offsite as much as possible. Such adhesives, sealants, and coatings shall be low VOC products, where suitable products are available.

.5 No toxic chemicals or fuels are permitted to be stored inside the building.

.6 Refueling of equipment is to be undertaken outside the building.

.7 Gas powered equipment is not to be used inside the building. Use electric or propane powered equipment only, and to acceptance of Owner and Consultant.

1.9 **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 site 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.

.3 The Contractor shall provide 24 hour surveillance on site from date of Substantial Performance to date of acceptance and occupancy by the Owner.

1.10 **PROTECTION OF SODDED AREAS**

.1 Protect all new sodded areas with warning signs and temporary fencing for full duration of grow-in period, until acceptance.

.2 Provide 1200mm high chainlink fence to completely enclose all newly sodded areas. Plastic snow fence will *not* be accepted.

.3 If sod is not established and accepted by the Consultant before the end of the growing season, then the fencing shall remain in place over the winter and for a minimum of 30 days after the start of the next growing season, and until acceptance of the sodded areas. Refer to Section 32 92 23, Sodding, for requirements for acceptance.

1.11 **REMOVAL OF TEMPORARY BARRIERS**

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

.2 Remove temporary enclosure around newly sodded areas once sod is fully established and/or when instructed to do so by the Owner.

1.12 **DUST CONTROL**

.1 Water down site on a daily basis and more often on windy days to control dust.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Safety Requirements Section 01 35 20

1.2 SITE SIGNBOARD AND NOTICES

.1 Provide construction sign, 2440mm x 3050mm (8'x10') in size, in location where directed by Consultant.

.1 Construct and paint sign and set plumb and level in neat wood framework and securely anchored in ground with posts.
.2 Text and artwork to be as provided by the Owner.
.3 Design sign to withstand hourly wind pressure of at least 0.48 kPa/hr.
.4 Structural design to be by a registered professional engineer in the Contractor's employ.
.5 Apply for and obtain sign permit where required by the municipality. Sign permit fee to be paid through the Cash Allowance included in the Contract.

.2 Signs and notices for safety or instruction to be in English language and commonly understood graphic symbols.

.3 Contractor may place his own sign on site. Other than Owner's and Contractor's signs, only safety and necessary instructional signs may be erected on site.

.4 All signs must be removed entirely and site made good, at the time of Substantial Performance, or when so directed by the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 PRECONSTRUCTION SURVEY

.1 Prior to commencement of any work on site, Contractor shall engage an Ontario Land Surveyor to prepare a preconstruction survey with the same level of detail as provided for in the survey issued as Supplementary Information with the tender documents.

.2 Contractor shall also include the costs to reinstate all iron bars.

.3 Submit four (4) copies of the completed, sealed survey to the Consultant.

.4 Following the completion of this survey the Contractor shall issue a letter, addressed to the Owner and copied to the Consultant, accepting conformity of the site with the Survey issued as supplementary information at the time of Tender.

1.2 LAYOUT OF BUILDING

.1 Stake out accurately all principal corners of the building, using the services of an Ontario Land Surveyor. Check lot lines and ensure that the building lines bear the exact location to the lot lines as shown on drawings. Confirmation of property lines is to be in accordance with the original survey and the preconstruction survey.

.2 Obtain, and pay for, an erosion and sediment control permit as required by the Municipality. This must be done before the building permit will be issued.

.3 At the time of mobilization or immediately thereafter, the Contractor is to confirm in writing that all required property bars are identified and that the site is visually in general conformance with the description in the documents.

.4 Report any dimensional discrepancies immediately to the Consultant, and confirm as soon as possible any job measurements required for shop drawings, etc. Co-ordinate all trades, including mechanical and electrical.

1.3 PROGRESS SURVEYS

.1 When foundations are in place, prepare and submit four (4) copies of a survey, prepared and sealed by an Ontario Land Surveyor, showing the exact location of all perimeter foundations in relation to boundaries and noting all discrepancies from drawings. Survey must also be updated periodically to show actual finished floor elevations in relation to Municipal Datum Point, as well as location and elevations of all new curbs, catchbasins, manholes (top and inverts), etc.

.2 Upon completion of site work (before sod application) and prior to application for Substantial Performance, submit to the Consultant six (6) copies of the same site plan submitted after completion of foundations work but supplemented to show outline of paved areas, curbs, walkways, final finished grades of all areas of site on maximum 10x10m grid, new manhole/catchbasin elevations and inverts, and location of all buried services.

.3 Upon total completion of the Work, update the survey and submit a digital copy and six (6) stamped printed copies and of the final, as-built, topographic survey, prepared and sealed by the Ontario Land Surveyor.

1.4 **DIMENSIONS**

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

.2 Verify that work is executed in accordance with dimensions indicated, that levels and clearances are maintained, and that work installed in error is rectified before construction continues.

.3 Check and verify all dimensions including interfacing of services. Dimensions, when pertaining to the work of other trades, shall be verified with the trade concerned. Ensure that all Subcontractors co-operate for the proper performance of the work.

.4 Do not scale directly from the drawings; this applies all drawings, whether in paper or digital format. If there is ambiguity or lack of information, immediately inform the Consultant. Any change caused by lack of such review shall be the responsibility of the trade concerned.

1.5 **SITE VERIFICATION**

.1 Include cost for underground service locates at all exterior site work locations. Modify layout of new work to suit (in consultation with Consultant).

.2 Include cost to survey site work to confirm final layout and grades, as specified above.

END OF SECTION

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.

1.2 CONCEALMENT

.1 Conceal all pipes, ducts and wiring in finished areas except where indicated otherwise.

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

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

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

1.3 GENERAL NOTES

.1 Refer to the Door Schedule and the Room Finish Schedule, and 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 steel deck. Where walls run parallel and under OWSJs the OWSJs 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 finished with sealer as specified.

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

.6 Hardware shown on Door Schedule refers to code requirements only. Refer to Hardware Schedule for total hardware required.

.7 H.M. doors and frames shall be prepared for security alarm devices (S.A.D.) and barrier-free door operators.

.8 All fabric finishes on walls shall be maximum 25 flame spread rating.

END OF SECTION

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 bury or burn any rubble, waste or packaging, or surplus materials. No dumping of waste, such as oil or paint, into sewers will be permitted.

.7 Dispose of waste materials in accordance with the Environmental Protection Act, R.S.O. 1990, C. E.19, and regulations under the Act, including:

- .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 R.R.O. 1990, Reg. 347: General - Waste Management

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 & DUST CONTROL

.1 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Remove mud deposited on public roads. Provide mud mats at all site access roads.

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

.3 Include daily watering of site to maintain dust control as part of tender submission.

.4 Secure filter cloth to chain link fence enclosure to inhibit dust. Install filter cloth to full height of enclosure (± 1800mm).

1.4 DISPOSAL OF WASTES

.1 Burying of rubbish and waste materials on Site not permitted.

.2 Disposal of waste or volatile materials, such as mineral spirits oil or paint thinner into storm or sanitary sewers prohibited.

.3 Meet Ministry of the Environment Standards and Guidelines.

1.5 **FIRES**

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

1.6 **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 Maintain entire site free from accumulations of snow and ice.

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

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

.5 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.

.6 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.

.7 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.

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

1.7 **CLEANING AT COMPLETION OF WORK**

.1 Employ a professional cleaning company to thoroughly clean all areas immediately prior to occupancy of the Work by the Owner. Cleaning company shall be an established firm, bonded and fully insured, and acceptable to the Owner.

.2 Provide manufacturer's printed cleaning and maintenance instructions to cleaning company. All finishes, equipment, fixtures, and other surfaces are to be cleaned in accordance with the product manufacturer's recommendations.

.3 Use cleaning products which are non-toxic, environmentally friendly products, and which will not leave residues or odours on surfaces.

.4 Do not apply sealers, wax, or polish to any flooring without the expressed permission of the Owner. All such products, and the methods of application, must be approved in advance by the Owner.

.5 Remove all temporary protective coverings provided during construction.

.6 Remove all protective film from switchplates and hardware, particularly kick plates. Remove miscellaneous labels from hardware, fixtures, equipment, and appliances, etc.

.7 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. Vacuum inside all cabinets and drawers and leave millwork ready for use. Remove paint spots and smears from all surfaces, including hardware.

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

.9 Clean hardware, aluminum, stainless steel, and other metal surfaces.

.10 Clean resilient and sheet flooring and all floor and wall tile.

.1 Vinyl composition tile (VCT) is to be broom swept only. The Owner will wash, wax, and polish VCT floors, and other resilient floors which require a wax finish.

.2 Clean no-wax resilient flooring in accordance with manufacturer's instructions.

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

.12 Clean all plumbing fixtures and fittings, including those located inside cabinetry or otherwise hidden from continuous view.

.13 Remove debris and surplus materials from the roof areas and accessible concealed spaces.

.14 Replace heating, ventilation and/or air conditioning filters at Substantial Performance, whether or not the units were operated during construction operations. If any units were operated without filters, clean ducts, blowers, and coils.

.15 Broom clean all asphalt and concrete 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.

.16 Remove any snow or ice from walks and paved areas, prior to occupancy.

.17 Ensure that all clean up operations specified in other sections has been performed.

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

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

1.8 **REPAIR WORK**

.1 All equipment, including mechanical and electrical equipment, shall be turned over in "as new" condition. Repair any damage, including dents and scratches. Repaint or touch up paint finish as necessary to return to new condition.

.2 Replace all broken glass.

.3 Repair any damage incurred during cleaning operations.

END OF SECTION

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.

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. Generally, these conditions include the following:

- .1 Completion of building structure and enclosing walls to the roof;
- .2 Completion of walls enclosing space to be occupied,
- .3 Completion of all required fire separations and closures in all areas to be occupied;
- .4 Completion of all required exits and fire separations, including all doors and hardware, and exit signs,
- .5 Completion of all shafts to rated assemblies above occupied area, complete with (temporary) fire separations.
- .6 Maintenance of floors, halls, vestibules and required means of egress to occupied areas to endure they are free of loose materials and other potential hazards;
- .7 Completion of building drains, sewers, water systems, septic system drainage systems and venting systems, including testing for areas to be occupied;
- .8 Completion of HVAC, power and lighting, including emergency lighting, for all areas to be occupied, including common areas and access routes;
- .9 Completion of fire safety systems for areas to be occupied, including sprinklers, standpipe, fire extinguishers, fire alarm system, and exterior fire route;
- .10 Provision of service facilities, including garbage rooms, service rooms, complete with required fire separations;
- .11 Secure and safe separation of areas to be occupied from areas that are incomplete and not to be occupied.

.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 Hydro, Fire Department, Building Department and Ministry of Environment.

.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 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. Submit a revised construction schedule, taking restrictions on work activities and hours into account; refer to Section 01 10 00 for special requirements in occupied buildings.

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, Stage 2, 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, E.M.S., 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 outline for Stage 3 of the OAA/OGCA Take-Over Procedures.

.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 Arrange for Consultant to prepare record drawing in AutoCAD format for the Board using the final as-built drawings. Pay for costs of record drawing preparation through the cash allowance included in the Contact.

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

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

.14 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.

.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 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.

.2 Additional site reviews, as requested by the Contractor or as necessitated due to the Contractor's failure to complete work as required, shall be paid for by the Contractor at a rate of $1,000.00 per visit, per consultant, plus the cost to prepare additional site review reports at per diem rates (rates as recommended by the OAA or PEO, or as negotiated in advance).

.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 **RELEASE OF SECURITY DEPOSITS FROM AUTHORITIES HAVING JURISDICTION**

.1 Contractor shall be responsible for obtaining release of all securities paid by the Contractor.

.2 Coordinate with Consultant and provide all submittals required by the Consultant and Owner in order to obtain release of securities paid by the Owner. Refer to Section 01 78 00, Closeout Submittals; note that funds will be retained in the Contract to cover the value of closeout submittals, including submittals required for the release of securities.

1.7 **WARRANTY PERIOD**

.1 The Warranty Period on this Project will expire **twelve (12)** 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.

1.8 **UTILITY CHARGES**

.1 The Owner will assume responsibility for electrical and water utility service billing.

END OF SECTION

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 both interior and exterior 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. If manuals are unavailable, the designated value of the submittals will be retained in the Contract; see below.

.4 One complete set of final approved Shop Drawings (bound separately) indicating corrections and changes made during fabrication and installation

.5 Keys and construction cores

.6 Maintenance materials

.7 As-Built Documents as specified in Section 01 33 00, Submittal Procedures

.8 Mechanical documents such as valve charts, frames as specified - refer to Divisions 21, 22, 23 and 25

.9 Electrical panel directories (typed and mounted in panels) - refer to Division 26

.10 Pressure Vessels Inspection Certificates

.11 Balancing Report for Ventilation System.

.12 Inspection Certificates required by Provincial, Municipal and other authorities having jurisdiction.

.2 Provide a Letter of Guarantee stating the load capabilities where required. Letter shall be endorsed by a professional engineer licenced to practice in the Province of Ontario.

.3 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 hard copy and one digital copy of Architectural, Mechanical, and Electrical Operations Data and Maintenance Manuals made up as follows:

.1 Bind data in vinyl hard covered, three-ring loose leaf binders for 212.5mm x 275mm (8-1/2" x 11") size paper. Digital copy shall be submitted in pdf (portable document format) on a single USB flash drive with label or tag identifying project.

.2 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.

.3 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.

.4 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 elevator, 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)
.5 Ontario Hydro certificate of inspection.

.3 Provide a disk or memory stick containing all construction progress photos submitted; refer to Section 01 32 00. Provide an index with printed images clearly identified with name of project, description of view and date taken. Disk in binder is 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 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 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, patent glazing, handicapped lift 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.

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 digital copy of the shop drawing manual, included on the USB flash drive with the digital copy of the maintenance manuals.

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, and Record Documents (electronic files).

.2 Prior to the date of Substantial Performance, request updated 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 The Consultant shall prepare architectural Record documents and be reimbursed for costs by the Contractor through the Cash Allowance included in the Contract.

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

.6 Provide final, as-built, topographical survey, as specified in Section 01 71 23, Field Engineering.

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.
- .1 The Consultant will review manuals once for completion and will then review only one resubmission.
- .2 If additional reviews are required, the Contractor will be invoiced for the Consultant's time at a rate of $150/hour.

1.8 **FINAL SUBMITTALS REQUIRED BY AUTHORITIES HAVING JURISDICTION**

.1 Confirm with Consultant for all final submittals required by the site plan agreement and site servicing agreement, as applicable. The items listed below are typical and should be considered minimum requirements.

.2 Submit the following to the Consultant:
- .1 As-built site servicing drawings, in AutoCAD compatible format
- .2 As-built landscape drawings, in AutoCAD compatible format
- .3 Certificate stating that the underground stormwater quality control structure (oil and grit separator) has been installed in conformance with the approved plans and that the unit has been inspected, cleaned and all adjustments have been completed.
  - .1 Device is to be inspected by the manufacturer; submit report.
- .4 Provide topographical survey of as-built conditions, per Section 01 71 23;
  - .1 Confirm that grading has been completed in accordance with approved grading plan.
- .5 Provide photometric drawing for exterior luminaires and confirm installation in compliance with approved plans.

.3 Submit as-built information for municipal and regional services on disk, plus hard copies. As-built information shall include:
- .1 Lateral location sheets
- .2 Final measurement sketches
- .3 Plan and profile paper plots
- .4 Sanitary design sheets
- .5 Shop drawings
- .6 As-built drawings in AutoCAD format

.4 Submit video inspection reports for sewer lines, consisting of:
.1 Hard copy of typed report
.2 DVD disk containing the sewer.dat file, report.txt, summary.txt, and;
.3 camera video with a separate file for each sewer line, with pan and tilt views at all lateral branches and potential defects.

.5 All submittals must be in format acceptable to the applicable municipal or regional authority. Review requirements with authorities having jurisdiction.

1.9 **VALUATION OF CLOSEOUT SUBMITTALS**

.1 Due to the high value to the Owner of the closeout submittals, including maintenance manuals and submittals required by Authorities Having Jurisdiction, for the purpose of project administration and calculation of Substantial Performance, the Closeout Submittals will be assigned a value of **$20,000.00** for architectural submittals and **$5,000.00** each for mechanical electrical and septic system submittals.

.2 The full assigned value of the submittals for each discipline will be held in the Contract until such time as all closeout submittals required for that discipline are delivered to the Consultant and are deemed complete and acceptable by the Consultant and applicable subconsultant.

.3 Architectural record drawings, to be prepared by the Consultant and paid through the Cash Allowance, are not included in the valuation of closeout submittals.

END OF SECTION

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 Conform to Ministry of Municipal Affairs and Housing, Building Development Branch, publication MMAH Supplementary Standard SB-2, Fire-Performance Ratings, for determination of the fire resistance ratings of typical building materials and assemblies.

.4 Fire rated assemblies shall otherwise be the tested designs of a recognized testing agency and shall be acceptable to Authorities Having Jurisdiction. Submit tested designs to Authorities upon request.

.5 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.

.6 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.

.7 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.

.8 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.

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

.10 Provide applied fireproofing as specified in Section 07 81 00 and intumescent coatings as specified in Section 09 96 46.

.1 Applied fire protective coatings shall be provided in accordance with tested assemblies and in accordance with the manufacturer's printed instructions.

.2 Provide tested assembly designs and products applicable to the specific member and construction assembly to be fireproofed, and the required fire resistance rating. All rated designs are to be approved by Authorities Having Jurisdiction and shall be acceptable to the Consultant.

.11 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 Firestopping system shall be tested for the time period required for the fire separation; ie. 1 hour, 2 hours, etc.

.3 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.

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

.1 Fire block is defined as “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 Concealed interior spaces must be separated from concealed spaces in exterior walls, attic, or roof spaces by fire blocks.

.3 Concealed spaces shall have fire blocks to limit the size of the concealed space as required by the OBC.

.4 Concealed spaces shall be separated, using fire blocks, at floor levels, at intersections between vertical and horizontal spaces, and at junctions with other spaces.

.5 Fire block materials shall conform to OBC and shall have a minimum 15 minute fire resistance rating. Penetrations of fire blocks must be firestopped.

.13 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.

.14 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.

1.2 **EXISTING BUILDING**

.1 Assume that fire separations in existing school have been compromised.

.2 **Include cost to add two continuous layers of 400mm high fire rated drywall on both sides of corridor walls where work is undertaken in the existing school. Include for work in ex. Kindergarten 115, 120, 121, 135 and Classrooms 114-1, 114-2, 114.3.**

.3 Include cost of providing continuous firestopping / caulking at steel deck flutes at work areas in existing school.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Hazardous Materials	Section 01 35 43
.2	Temporary Barriers and Controls	Section 01 56 00
.3	Execution	Section 01 73 00
.4	Masonry	Division 04
.5	Metals	Division 05
.6	Firestopping	Section 07 84 00
.7	Openings	Division 08
.8	Finishes	Division 09
.9	Specialties	Division 10

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 Reg. 332/12); The Ontario Fire Code; The National Building Code, 2010; and the National Fire Code. Refer to current editions of all standards.

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

.3 Environmental Protection Act, R.S.O. 1990, C. E.19, and regulations under the Act, including:
- .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 R.R.O. 1990, Reg. 347: General - Waste Management

.4 Occupational Health and Safety Act, and regulations under the Act, including:
- .1 O.Reg. 213/91 Construction Projects
- .2 O.Reg. 278/05, Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations amended 479/10.
- .3 O.Reg. 860/90 Workplace Hazardous Materials Information System (WHMIS)
- .4 All regulations regarding “Designated Substances”

.5 Regulations for the transport of asbestos waste, including:
- .1 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
- .2 Dangerous Goods Transportation Act, R.S.O. 1990, c. D.1

.6 Resilient Floor Covering Institute (RFCI)
- .1 Recommended Work Practices for Removal of Resilient Floor Coverings.

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

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 Copies of the original working drawings for the construction of the building are available to the Contractor. Refer to Section 00 31 00.

.3 An inventory of hazardous materials has been conducted for the existing building; a copy of which is included in the Supplementary Information volume. Contractor to coordinate removal of asbestos and other hazardous materials, which is to be performed by one of the firms prequalified by the Owner.

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

1.4 **SUMMARY OF WORK**

.1 Removal of partitions, walls, doors, frames, ceilings, windows, glazed exterior openings, slab on grade concrete floors, roof assemblies.

.2 All removed materials shall become property of the Contractor and shall be removed from the site.

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

.4 Repair or replace existing damaged surfaces scheduled to be repainted. Finished surfaces to be ready for finish painting.

.5 Remove HVAC equipment, electrical fixtures and all other items so noted on drawings as required to accommodate new work.

.6 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.

.7 Removal of hazardous materials shall be completed as indicated in Supplementary Information (Volume 3). If the Contractor uncovers additional materials within building which are suspected to be hazardous, they shall inform the Consultant, and the Owner. The Owner will arrange to have materials tested and, if necessary, removed. Removal of additional hazardous materials not identified in the designated substances report is to be performed by forces appointed by the Owner and paid through the Cash Allowance included in the Contract for additional removals; refer to Section 01 35 43.

.8 Remove, transport, and dispose of hazardous materials in accordance with applicable laws.

.9 Renovations to Classrooms, Corridors and Kindergarten Rooms.

.10 Removal of load bearing and non load bearing masonry walls and repairs / infill.

.11 Removal of slab on grade and replacement with concrete infill to accommodate new underground work.

.12 Removal of floor finishes (Terrazzo / VAT / VCT) and preparing floors for new finishes.

.13 Repairs to existing walls / ceilings to maintain fire separations.

.14 Removal of roofing and replacement with new roofing.

.15 Removal and reinstallation of existing ceilings to accommodate work in Corridors, Classrooms, Kingergartens.

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1.5 **PROTECTION**

.1 Erect barriers, notice and warning boards and maintain all protection of all kinds for the protection of the workmen on the Work, for the protection of adjoining property and for protection of public.

.2 Protect all existing paving and site amenities. Make good damage to the approval of the Consultant.

.3 Prevent movement, settlement, and damage to existing building to remain, 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 licenced in the Province of Ontario.

.4 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.

.5 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. Cover existing windows, doors, louvres, etc., opening to construction areas with minimum 16mm Type X gypsum board on steel stud framing to prevent exposure to construction activities.

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

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

.8 During demolitions operations, keep work wetted down to prevent dust and dirt from rising.

.9 Take precautions to guard against movement or settlement of services and utilities. Provide and place bracing or other means of support.

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

1.6 **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. If access to exit must be through an area under construction, provide smoke tight enclosure with minimum 45minute fire resistance rating. 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.**
Access to the existing fire fighting cistern to be maintained throughout construction.

.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 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.

1.7 **SCHEDULE OF WORK**

.1 Construction enclosures must be installed and construction area secured before any work is undertaken. Enclosure must conform to Ministry of Labour and Municipal requirements as well as these specifications.

.2 Refer to Section 00 20 00 for dates when work areas will be accessible to Contractor.

1.8 **SERVICES**

.1 Before commencing demolition, seal and cap mechanical and electrical services serving the areas to be demolished, unless otherwise noted. Mark location and type of service of all capped services at the site. Submit record drawing showing locations and dimensions of all capped services.

.2 Maintain and preserve any service utilities traversing work area unless otherwise noted.

.3 In building areas to be renovated, seal and cap mechanical and electrical services as required to facilitate removals indicated on drawings. Mark location and type of service of all capped services.

.4 Include cost to X-Ray concrete floors and walls to determine locations of buried hidden services.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paintable, elastomeric filler:
- .1 For filling of holes in masonry.
- .2 Mor-Flexx by Sashco, in colour to coordinate with substrate.

PART 3 - EXECUTION

3.1 DEMOLITION

.1 Refer to drawings for demolition plans and notes.

.2 Coordinate with asbestos abatement contractor to facilitate asbestos removals and to ensure asbestos is removed where required to permit demolition and alteration Work to proceed.

.3 Demolish masonry walls in small sections. Do not permit masonry to fall in mass from one level to another.

.4 Remove and carefully lower wood or structural steel framing if applicable.

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

.6 Cut terrazzo floors and concrete floor slabs as required to accommodate installation of new frames and underground services.

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

.8 In areas of building to be altered under the scope of Work of this Contract, remove all partitions and accessories, and all other items not indicated or noted to remain or be re-used.

.9 Remove mechanical and electrical equipment and similar materials. Refer to mechanical and electrical demolition drawings.

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

.11 Upon discovery of mould or mouldy materials remove and dispose of these separately.

.12 If any additional 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.
- .1 Do not resume work in this area until it has been cleared by an Abatement Consultant.
- .2 Coordinate removal of any identified designated substances by trained forces appointed by the Owner; to be paid through the Cash Allowance. Hazardous material abatement is to be completed prior to recommencing demolition work in the area.

.13 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.

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

3.2 **SALVAGING OF BRICK**

.1 Coordinate with mason to determine the amount of clay brick required for masonry work.

.2 Brick will be required for repairs to the exterior of the building for infill around openings.

.3 Clean salvaged masonry and stockpile on platforms.

3.3 **SALVAGING, CLEANING & REPLACEMENT OF EXPOSED BRICKWORK**

.1 Scrape mortar from face of existing brick. Cut back all redundant flashings as far as possible and remove grout, ready for regrouting by mason. Remove any penetrating steel ties and supports associated with demolished walls.

.2 Cleaning of masonry is to be undertaken when temperature, site and wind conditions are favourable.

.1 Confirm environment conditions required for application of cleaning solutions with product manufacturer.

.2 Do not allow cleaning solutions to dry on brickwork; particular care must be taken in hot weather.

.3 Do not undertake cleaning when site is dusty.

.4 Remove any loose contaminants with non-metallic hand tools.

.5 Select the appropriate cleaning solutions and follow the manufacturer’s recommended instructions. Do not use unbuffered muriatic acid.

.6 Protect adjacent materials and nearby plants and grass from damage as noted above.

.7 Saturate the area to be cleaned, flushing with water from top down. Keep masonry saturated to avoid absorption of the cleaning solution or dissolved particles. Keep surfaces below the area being cleaned wet until after the final rinse to prevent streaking.

.8 Apply the cleaning solutions in accordance with the manufacturers printed instructions. Use a long handled stiff fibre brush or other type as recommended by the cleaning solution manufacturer. Do not use metal brushes.

.9 Rinse thoroughly. Flush walls with large amounts of clean water from top to bottom before cleaned surfaces can dry.

.10 Salvage brick from new opening locations for reuse by mason at areas where damaged brick is to be replaced.

3.4 **REPAIRS AND 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. This includes new openings with lintels for Mechanical trade.

.2 Repair damage to existing walls in areas scheduled to be repainted, where damage is to substrate, not just the coating. Repairs to deteriorated coatings are specified in Section 09 92 00. Repair masonry surfaces with patching compounds and fillers. Cut out and replace damaged sections of gypsum panels; refer to section 09 29 00 for gypsum board work. All repairs to be completed to level required for finish painting.

3.5 **SHORING**

.1 New openings in structural and non-structural walls shall be shored to accommodate work.

.2 The cost engineered shoring drawings shall be included in the bid price and shall be the responsibility of the Contractor.

.3 A copy of the engineered shoring drawings shall be included in the Operation & Maintenance Manual for record purposes.

3.6 **CUTTING OF CONCRETE SLAB ON GRADE**

.1 Cut slab and remove sections as required to do new plumbing and drainage work, and as indicated on drawings. Assume minimum 225mm slab thickness.

.2 For pricing purposes, assume that 10% of the cutting required for removals of slab on grade with have to be performed using hand tools in order to avoid damaging electrical conduit located within the slab.

3.7 **REMOVAL OF EXISTING FLOOR FINISHES**

.1 Existing floor finishes shall be removed and old adhesive removed from the existing concrete slab by wet scraping, and in accordance with Health & Safety requirements. Use of solvents, or grinding of floor finishes will not be accepted.

.2 Existing concrete floors shall be prepared according to manufacturer's instructions for new adhesive applied finishes.

.3 Repair damaged areas of concrete floors by use of patching compounds and fills. Refer to Section 09 01 61 for flooring restoration.

.4 Protect existing flooring, to remain, from damage.

3.8 **CUTTING AND PATCHING OF EXISTING CONCRETE FLOORS**

.1 Cut existing slab-on-grade as required to install new service connections.

.2 Excavate below slab to depth required for installation of services. Coordinate with mechanical.

.3 After completion of installation and testing of new services, repair concrete slab-on-grade as follows:

.1 Backfill with 300mm deep clean, clear crushed stone, 19mm size, imported from approved source. Compact to refusal with manually operated vibratory tampers.

.2 Provide new 15 mil polyolefin vapour barrier over granular backfill.

.3 Provide dowels to tie existing and new slab sections together; drill into edge of existing slab as required to insert dowels. Provide 19mm diameter x 450mm long smooth steel dowels and install half way into existing slab edges at 400mm on centre, grouted in with non shrink grout. Grease exposed half of dowels before pouring new concrete slab.

.4 Pour new slab to match depth and level of existing slab on grade.

.4 Concrete shall be 25MPa at 28 day strength. Use ready mix concrete only.

.5 Drypack concrete grout shall consist of 1 part Portland cement, 1½ parts sand, 2 parts 6mm gravel, with water as required to dampen the mix.

.6 Reinforcing steel shall be shall be deformed bars of 400 MPa yield strength. Detail reinforcing in accordance with ACI 315.

.7 Supply and install concrete, reinforcing steel and formwork, including placing, finishing, and curing, in accordance with CSA-A23 and CSA-G30.

.8 Chip out slab on grade and prepare concrete floors to receive new floor finishes.

.9 Provide minimum 300mm thick 19mm diameter clear stone over 98% SPDD compacted sub-base.

.10 Place 15 mil polyolefin sheet vapour barrier over stone base and provide fully taped joint to existing vapour barrier.

.11 Include cost to feather out concrete floors between adjacent rooms where new openings are created between rooms. Assume 25mm difference in slab elevations and 10 square metres of featherring for location.

3.9 **TERRAZZO REPAIRS**

.1 Repair terrazzo to TTMAC Specification standards.

.2 Match existing terrazzo floor colour and pattern.

3.10 **REMOVAL OF CEILINGS**

.1 Remove existing ceilings and bulkheads in areas where new ceilings and bulkheads are indicated, and as shown on drawings.

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

.3 Where ceilings are to be removed to accommodate work, and later reinstalled, carefully disassemble ceilings to the extent required. Clean all components, wrap for protection, clearly label package contents, and store in a safe location until they are to be reinstalled.

.4 Where ceilings are to remain after adjacent walls or bulkheads are demolished, remove ceiling components as required to complete demolition work. Coordinate with forces doing new ceiling work, to confirm what components are to be retained for reuse. Cut ceiling tiles may not be used; new full or appropriately cut tiles will be required.

.5 Where ceiling mounted equipment is indicated to be removed and reused, or where it must be temporarily removed to accommodate the Work, it is to be carefully removed, cleaned, wrapped, labelled as to contents, and stored in a safe location, ready for reinstallation.

.6 Repair damaged gypsum board ceilings to remain, in renovated areas, to level ready for finish painting.

.7 Existing ceilings are fire rated; retain fire rating when repairing and replacing ceilings.

.8 Recessed light fixture shall be protected in accordance with ULC R210 assembly requirements.

3.11 **REMOVAL OF TACK BOARDS / CHALKBOARDS & WALL MOUNTED CONDUIT / RACEWAYS / EQUIPMENT ETC.**

.1 Remove wall mounted items where indicated on drawings and where items interfere with new work.

.2 Tack board adhesive shall be removed from wall by manual grinding and scraping in combination with mechanical wire brushing. Assume 80% adhesive wall coverage of tack board faces.

.3 Fill holes and repair walls where raceways, conduit, millwork, chalk boards and other mechanically fastened equipment is removed.

.4 Provide textured finish on masonry to match lightweight block and provide smooth finishes on gypsum board surfaces.

3.12 **NEW CONDUIT**

.1 Cut out masonry to accommodate installation of all new conduit. Surface mounted conduit and / or wiremould will not be accepted.

.2 Patch masonry and score masonry repairs to match mortar joint pattern.

3.13 **ROOF AND WALL OPENINGS**

.1 Remove all roof curbs, abandoned vents and flashings, abandoned gas lines, and all associated supports, sleepers, and accessories, where indicated on drawings.

.2 Cut openings required for new duct work and other rooftop equipment indicated in the documents. Coordinate cutting of new openings to correspond with installation of new work; ensure roof and wall openings remains watertight at all times.

.3 Coordinate with roofing trade to ensure that openings in the roof, resulting from demolition work, are made watertight immediately.

.4 Cover redundant openings in steel deck as follows:

.1 Openings up to 300mm in any dimension:

.1 Provide minimum 20 gauge galvanized steel plate extending minimum 300mm beyond opening in each direction. Mechanically fasten to roof deck using stainless steel fasteners.

.2 Provide wood decking (38mm thick) at wood deck.

.2 Openings up to 450mm:

.1 Cut back existing roof deck to nearest joists and provide new galvanized steel deck spanning minimum 2 joists, and mechanically fasten using stainless steel fasteners, unless indicated otherwise on structural drawings.

.3 Openings over 450mm:

.1 Provide 125 x 125 x 6 steel angle framing welded to two OWSJ's.

3.14 MECHANICAL AND ELECTRICAL WORK

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

.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.

3.15 ROOFING

.1 Perform roofing work in accordance with scope of work identified on Volume 2 drawings and specifications prepared by Pinchin.

3.16 REMOVAL OF CLERESTORY WINDOWS AND CURTAIN WALL GLAZED SECTIONS

.1 Remove aluminum windows and frames where indicated and provide new. Take care not to damage masonry.

.2 Remove glazed curtain wall panels and replace with operable / fixed and / or insulated panels.

.3 Immediately fill all holes in structure, resulting from removals, with paintable, elastomeric sealant specified above.

.1 Colour of sealant shall be closest available match to the substrate.

.2 Install sealant in accordance with manufacturer's instructions for the substrate type.

.3 Touch-up paint cured sealant with exterior latex paint, colour matched to existing substrate.

.4 Where frames are to remain, Contractor shall confirm hinge quantities and locations and co-ordinate with hardware and hollow metal sub-contractors.

.5 Secure and make weather tight openings on a temporary basis until new clerestory windows are installed.

3.17 **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

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 00

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 fibre forms internally treated with release material.

.5 Square fibre forms:

.1 Sonotube Square Fibre Forms by Sonoco Ltd. with square fibreboard 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 type which 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. Only new material to be used for exposed to vies concrete.

.5 Form release agent: Chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps. Form released agent must be suitable for use on exposed sandblasted concrete.

.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. Form stripping oil shall not be used on exposed concrete.

.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)

.2 Waterstop by W.R. Meadows

.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**

.1 Conform to CSA A23.1.

.2 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.

.3 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.

.4 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.

.5 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.

.6 For multi-storey construction, reshore beams and slabs to prevent overloading of the structure while constructing the work above.

3.4 **FIELD QUALITY CONTROL**

.1 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

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3.5 **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.

3.6 **MECHANICAL AND ELECTRICAL WORK**

.1 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

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 40 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 23 Shop Drawings, Product Data and Samples. 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, spacing, 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.

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 Do not drive or force reinforcement into fresh concrete.

.4 Concrete cover to be not less than required for fire rating.

.5 Use only reviewed shop drawings and the Structural Drawings for placing of reinforcement. Report discrepancies to the Consultant before proceeding.

.6 Before placing, remove all loose scale, dirt, oil or other coatings, which would reduce bond.

.7 Turn the ends of tie wire towards the interior of the concrete.

.8 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.

.9 No splicing of reinforcement is permitted other than shown on the Structural Drawings.

.10 Do not cut reinforcement without written approval of Consultant.

.11 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.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 All cast-in-place concrete including supply, placing, finishing and curing.

.2 Moisture vapour reduction admixture in concrete for interior slabs on grade.

.3 Installing embedment.

.4 Grouting under base plates and bearing plates.

.5 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 40 00.

.4 Structural Steel, Section 05 10 00
.

.5 Steel Joists, Section 05 20 00.

.6 Under Slab Vapour Barrier, Section 07 26 16.

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 ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

.6 ASTM E 1643-11 Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

.7 CSA A5, ASTM C150 Standard Specification for Portland Cement.

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

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

.10 CAN/CSA A3000, Cementitious Materials for Use in Concrete.

.11 CAN/CSA S448.1, Repair of Reinforced Concrete in Buildings.

.12 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.

1.7 WARRANTY

.1 Provide manufacturer's 10 year warranty for moisture vapour reduction admixture placed in interior slab–on-grade. Warranty shall cover repair or removal of failed flooring system, including application of a moisture remediation coating system on concrete subfloor, and supply and installation of new flooring to match existing. Warranty shall commence at the date of Substantial Performance of the Contract.

PART 2 - MATERIAL

2.1 **CONCRETE MIX MATERIALS**

.1 Portland cement: to CSA-A5.

.2 Cementitious hydraulic slag: to CSA-A363.

.3 Flyash: to CSA-A23.5, Type CI.

.4 Water: to CAN/CSA-A23.1.

.5 Aggregates: 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 2006, 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 fibre additive: fibrillated polypropylene fibres 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

.12 Moisture Vapour Reduction Admixture (MVRA):
- .1 Non-toxic, liquid admixture reacting chemically with concrete to eliminate moisture vapour emission and form a permanent barrier (capillary break) integral to the concrete.
- .2 MRVA to be Vapor Lock 20/20 as manufactured by Speciality Products Group, Barrier One MVRA, or Concure Systems MVRA, subject to conformance with these specifications.

.13 Pigment for coloured ready mix concrete as manufactured by Interstar or approved equal.

2.2 OTHER MATERIALS

.1 Grout: Premixed, non-metallic, non-shrink:
- .1 Euco NS Grout by Euclid 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:
- .1 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 Vapour barrier:Refer to Section 07 26 16

.11 Rigid insulation: Extruded polystyrene boards: Refer to Section 07 21 13 for perimeter insulation
and insulation below slabs.

.1 Styrofoam SM by Dow Chemical
.2 Styrofoam HI-100 by Dow Chemical

.12 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

.13 Elastomeric bearing pads: Virgin natural polyisoprene or virgin polychloroprene conforming to CAN/CSA-S6,

.14 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.

.15 Controlled density concrete fill, f'c = 4 MPa:
.1 K-Crete by Dufferin Concrete Products or equivalent

.16 Prefabricated Seepage Protection System:
.1 Terradrain 200 by Terrafix Geosynthetics Inc.
.2 Weeperwick by Subsurface Systems Inc.

.17 Bentonite Geotextile Waterproofing:
.1 Voltex by CETCO (distributor : DRE Industries)

.18 Crack Filler Epoxy: Capweld 524 by Cappar Ltd.

.19 Base under concrete Slabs on Grade: Clean, crushed stone, 20 to 22mm.

.20 Pigment for coloured concrete where specified on Architectural drawings to suit Architectural requirements.

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 except where MVRA admixture is required. Obtain approval of the Consultant for the use of admixtures other than water-reducing and air entraining

agents. Add moisture vapour reduction admixture (MVRA) in accordance with manufacturer's recommendations to all ready mix concrete to be placed in interior slab on grade.
Do not add plastic fiber to concrete containing MVRA.

.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 above grade 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 Structural 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: 10 MPa

.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 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%

.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 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: 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: 0.52
.5 Nominal maximum size of coarse aggregate: 20mm. Increase to 40mm where slab-on-grade thickness exceeds 130mm
.6 Slump: 50mm to 110mm
.7 Add moisture vapour reduction admixture in accordance with manufacturer's recommendations to all ready mix concrete to be placed in interior slab on grade, at the plant or at the job site. (Note: plastic fibre additive is not permitted with MVRA admixture).
.8 Slump at time and point of discharge, after addition of 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: 25 MPa
.4 Nominal maximum size of coarse aggregate: 20mm
.5 water/cementing material ratio: 0.42 – 0.52
.6 Slump at time and point of discharge: 50mm to 110mm
.7 Add moisture vapour reduction admixture in accordance with manufacturer's recommendations to all ready mix concrete to be placed in interior slab on grade, at the plant or at the job site

.11 Construction Method:

.1 Place & compact 250mm of clean, crushed stone, 20 to 22mm size.
.2 Construct slab-on-grade on 15 mil polyolefin sheet vapour barrier placed directly below concrete. Terminate vapour barrier by extending vertically up the abutting concrete walls and sealing to wall.
.3 ASTM E 1643-11 Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
.4 Saw cuts should be done with a dry process (soft-cut on the same day of a pour).
.5 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.
.6 Protection: Protect finished and cured slab from surface water (ie. rain, snow).
.7 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 at 28 days: 25 MPa
.4 Nominal size of coarse aggregate for:

.1 Toppings between 25 and 35 mm thick: 10mm
.2 Toppings between 35 and 50mm thick: 14mm
.3 Thicker 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: 32 MPa
.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: 32 MPa
.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 vapour 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.

.6 The geotechnical/concrete Inspection and Testing agent on site will provide representation for the MVRA manufacturer and must be present at the job site during placement of all MVRA treated concrete. Do not proceed without this representative being present.

3.5 FINISHING 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. At interior slab on grade (with MVRA), cover slab surfaces with plastic film or waterproof paper per ACI 302.2R for minimum 24 hours.

.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 FORMED 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.

.6 Provide galvanized finish to all concrete surfaces exposed to public view at the exterior concrete columns at the entrance canopy.

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 250mm of clean crushed stone, 20 to 22mm size. Refer to Fill Type F1 – Section 31 23 00.

.3 Over crushed stone, lay 15mil polyolefin sheet vapour barrier. Lap all joints 150mm and seal any punctures prior to placing concrete. Seal all joints and punctures with tape. Repair all tears or holes with layers of sheeting, tapping all seams. Extend vapour barrier 200mm up walls at edge of slabs. Refer to Section 07 86 16.

.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 fibre 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 TESTING OF SLAB CONTAINING MOISTURE VAPOUR REDUCTION ADMIXTURE

.1 Moisture testing of all concrete containing moisture vapour reduction admixture (MVRA) shall be by the admixture manufacturer. The manufacturer shall issue project specific warranties prior to installation of finishes; no additional field slab moisture or pH testing will be required.

.1 Should further testing be required due to the failure of the Contractor to incorporate the specified product, the cost of all subsequent testing, as well as the cost of slab remediation, shall be the responsibility of the Contractor.

.2 The geotechnical field testing technician will provide representation for the MVRA manufacturer at the MVRA manufacturer's expense. The representative must be present at the jobsite during placement of all MVRA treated concrete. Proceeding with placement of concrete dosed with the MVRA without presence of a representative of the manufacturer will result in the Contractor bearing the cost to core and ship appropriate material for testing per ASTM D 5084.

.3 The field testing technician shall, at the expense of the MVRA Manufacturer, procure at least one 100mm cylinder from each day of placement of MVRA dosed concrete for the purpose of subsequent hydraulic conductivity/coefficient of permeability testing. All cylinders to be tested in accordance with ASTM D 5084 by *an* independent lab.

4. Test results must conform to manufacturer specified limits.

.1 Should any cylinder deliver results in excess of 6.0 E-08cm/sec, the MVRA manufacturer shall procure, at their expense, a core (or cores) from that day of placement. The cores shall be tested at an independent laboratory for hydraulic conductivity (coefficient or permeability) per ASTM D 5084.

.2 Should any core deliver results in excess of 6.0 E-08cm/sec per ASTM D 5084, the MVRA manufacturer shall provide, at their expense, a topical moisture system mitigation system for all areas not meeting the stated limit.

3.16 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.

3.17 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.

3.18 COLOURED CONCRETE

.1 Areas indicated on the Tender documents as Coloured Concrete shall be coloured using integral colour for ready mix concrete.

.2 The contractor must be a licensed installer experienced with working with integrally coloured concrete and shall supply all labour and materials including concrete, coloured hardeners, reinforcement, release agents and sealers.

.3 Provide a two-year warranty covering spalling, scaling, colour fading, delamination and cracking.

.4 Use coloured pigment for ready mix concrete, as manufactured by Interstar or approved equal, at a ratio of 7% pigment to cementitious materials. Colours to be selected by the Architect from the range of colours. The contractor shall provide test pour and have the colour approved by the Architect to be sure that the results will meet the expectations.

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

PART 1 - GENERAL

1.1 RELATED WORK

.1	Grouting of reinforced masonry	Section 03 30 00
.2	Concrete block	Section 04 22 00
.3	Mortars for tile work	Section 09 30 00

1.2 REFERENCE STANDARDS

.1	CAN/CSA A179	Mortar and Grout for Unit Masonry
.2	CAN/CSA A371	Masonry Construction for Buildings
.3	CSA A3000	Cementitious Materials Compendium
.4	ASTM C 780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
.5	ASTM C 1357	Standard Test Methods for Evaluating Masonry Bond Strength

1.3 QUALITY ASSURANCE

.1 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.

.2 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.

.3 Submit test data as specified below.

1.4 COLD WEATHER REQUIREMENTS

.1 During cold weather, lower than 5 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.

1.5 SUBMITTALS

.1 Submit three (3) 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.

.2 Submit Data Sheet on Dry-Block II Mortar Admixture. Submit Technical Bulletin on Cleaning Masonry Containing Dry-Block.

.3 At the completion of the masonry work, submit letter of certification from the mason, certifying that only mortar containing integral water-repellent mortar admixture, added at the manufacturer's recommended rate, has been placed in exterior concrete masonry walls.

1.6 **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.

1.7 **TESTING**

.1 Testing of mortar materials will be carried out by Testing Laboratory designated by Consultant.

.2 Pay for tests from Cash Allowance, Section 01 10 00.

.3 Submit samples of sand and water for testing to ensure that mortar will not produce efflorescence.

.4 Test all mortar to be mixed with sand on site according to CSA-A179, aggregate to cementitious ratio test. Testing Company to supervise mason in preparation of a sample mix which will act as the control ratio, as determined by testing company. "Sample ratio" tests will be conducted throughout construction and compared to control ratio. These ratios must not differ by more than 15%.

.5 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.

.6 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 CSAA179.

.7 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
.5	Water-repellant admixture:	Dry-Block II Mortar Admixture by Grace Construction Products, for exterior concrete masonry, or equal as recommended and supplied by the manufacturer of the architectural concrete masonry.

2.2 **MORTAR**

.1 Mortars to be Portland cement/ hydrated lime/ sand mortars to the property standards of CSA A179, as follows:
- .1 Bulk preblended silo mix as supplied by Max-Mix.
- .2 Coloured mortar will be required in exterior masonry. Colours to be selected by Consultant to coordinate with masonry colours.
- .3 Colourants to be premixed with mortar materials.
- .4 For smaller areas of masonry requiring mortar of a different colour, mortar may be preblended, factory calibrated, bagged mortar; Betomix Plus by Daubois Inc., or equivalent by King Masonry Products.

.2 Mortar for masonry foundations, load bearing walls and partitions, and lateral force-resisting system components for seismic design, to be Type 'S' as per property specifications of CSA A179.

.3 Mortar for exterior masonry veneer, and non-load bearing walls and partitions to be Type 'N' as per property specifications of CSA A179, unless indicated otherwise on the Structural Drawings.

.4 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.

.5 Water repellant admixture to be used in all mortar for exterior concrete masonry units.

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.

.2 Refer to structural drawings for 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 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 For mortar for concrete masonry units in face of exterior wall, add moisture repellant additive to water prior to charging mortar mix. Add at rate recommended by the additive manufacturer and reduce water accordingly.

.5 Obtain manufacturer's approval for any additives.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete & Masonry Reinforcement	Section 03 20 00
.2	Masonry Mortar and Grout	Section 04 05 13
.3	Masonry Accessories	Section 04 05 23
.4	Concrete Masonry Units	Section 04 22 00

1.2 SUBMITTALS

.1 Submit product data sheets for all reinforcement types proposed for use in this project, in accordance with Section 01 33 23.

.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.

PART 2 MATERIALS

2.1 MATERIALS

.1 All steel components specified herein for installation in exterior wall assemblies shall be hot dipped galvanized after fabrication, or shall be stainless steel as specified on drawings or as required by Code.

.2 Stainless steel shall be type 304 or 316.

.3 Reinforcing bars: to CSA G30.18, Grade 400.

.4 Masonry Reinforcement:

.1 This Specification is based on products manufactured by Blok-Lok Limited. Products listed by Hohmann and Barnard, Inc. and Wire-Bond are approved equivalents.

.2 Size: Wall thickness less 50mm.

.3 Weight :

.1 Standard Ladder type reinforcement shall be extra heavy duty, with 4.8mm side wires and 3.8mm (9 ga) cross wires, welded.

.2 Ladder type reinforcement shall be super heavy duty where noted below or on drawings, with both side and cross wires 4.8mm thick, welded.

.3 Truss type reinforcement shall be super heavy duty, with both side wires and cross wires 4.8mm thick, welded.

.4 Finish:

.1 Hot dipped galvanized after fabrication to ASTM A153-B2 and CSA G164, minimum 1.5 oz/sq. ft.

.2 Provide stainless steel where indicated below, or on drawings.

.5 Type: For multi-wythe solid walls above & below grade:

.1 Blok-Lok Cavity-Lok BL12, extra heavy duty, 4 wire; H&B #240; or Wire-Bond Series 200 Ladder 4 Wire. Galvanized finish above grade, stainless steel finish below grade.

.6 For multi-wythe solid walls above grade consisting of brick and block.

.1 Blok-Lok Tri-Lok BL11, extra heavy duty, 3 wire; H&B #230; or Wire-Bond Series 200 Ladder 3 Wire.

.7 For single wythe, solid, interior masonry walls:

.1 Blok-Lok BL10; H&B #220, or Series 200 Ladder 2 Wire by Wire-Bond.

.8 For cavity walls:

.1 Blok-Lok Econo-Cavity Lok BL21, super heavy duty, with 4.76 mm wire; H&B #250; or Wire-Bond Series 400 Ladder Fixed Tab.

.9 For cavity walls when interior concrete block wythe is constructed in advance of exterior face brick/block:

.1 Blok-Lok BL42 providing rigid two way anchorage of both wythes, with System 2000 ties; H&B #280 Dub'l Loop-Lok; or Wire-Bond Tab Lock Ladder with 4.8mm diameter locking pintles.

.10 For cavity walls where masonry veneer is laid in other than running bond:

.1 Blok-Lok BL42 providing rigid two way anchorage of both wythes, with System 2000-Seismic ties; H&B #280-SIS Dub'l Loop-Lok Ladder; or Wire-Bond Ladder Adjustable Tab Lock Seismic with 4.8mm diameter locking pintles and welded wire bond clip. Provide continuous 4.8mm diameter wire in veneer wythe.

.2 This is applicable to masonry veneer laid in stack bond and soldier courses.

.11 For cavity walls where joints in exterior and interior wythes do not align and adjustable reinforcing specified above cannot be used:.

.1 Interior wythe block reinforcement: extra heavy duty reinforcement as specified above.

.2 Ties between wythes: Blok-Lok BL-507 Anchor 400mm x 400mm spacing and Flex-O-Lok Tie, HB DW-10 with VBT tie.

.3 Fasteners for anchors: Hilti "Kwik-Con II" -14-114 THWH stainless steel, or Ucan "Scru-it" SSH 14114 stainless steel.

.4 All reinforcing and ties hot dipped galvanized unless specified otherwise on drawings, anchors to be stainless steel.

.12 Provide prefabricated tees and corners.

.5 Wall Ties:

.1 Masonry to Masonry:
.1 Corrugated Wall Ties of 1.2 mm (18 ga.) galvanized steel, 22mm wide, by length required for the application. Interior use only.
.2 Length to be long enough to embed minimum 75 mm into each bearing or to fit dovetail anchor slots, unless otherwise noted on drawings.

.2 Masonry to Masonry at low wall sections:
.1 For tying and stabilizing 200mm high masonry cavity wall section below window areas use stainless steel helical wall tie system Spira-Lok by Blol-Lok, minimum 8mm diameter, of length to embed minimum 76mm into both wythes of masonry.

.3 Masonry to Structural Steel:
.1 Blok-Lok Flex-O-Lok BLT9, sized to suit wall thickness less 50mm, with continuous weld-on anchors Flex-O-Lok, type A; H&B VEE-Byna Tie with 359 weld-on ties; or Wire-Bond Triangular Tie 1100 with Type 1 Weld-On Anchor.
.2 Ties minimum to be minimum 4.76mm stainless steel wire. Weld-on anchors to be minimum 6.35mm diameter stainless steel wire.

.4 Dovetail anchor slots and ties: Hot dipped galvanized anchor slots with minimum 9 gauge hot dipped galvanized ties.

.6 For Securing Insulation: Wedge-Lok by Blok-Lok

.7 Where stack bond and soldier courses are indicated on drawings, as well as other bond types other than running bond, provide continuous horizontal reinforcement in veneer wythe. Reinforcement shall be generally as specified above, but of type fabricated to receive continuous 4.8mm diameter galvanized steel wire to reinforce veneer wythe. Provide wire to suit length of wall sections. Ladder style reinforcing in stack bond masonry to be spaced at 200mm (every course).

PART 3 - EXECUTION

3.1 INSTALLATION OF MASONRY ANCHORAGE AND REINFORCEMENT

.1 Refer to Section 04 22 00 for installation of masonry anchorage and reinforcement.

.2 Install ties in accordance with Ontario Building Code.

.3 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.

.4 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.

.5 Install reinforcement as indicated for the materials specified, in conformance with structural drawings and manufacturer's instructions.

.6 Provide and install prefabricated tees and corners at wall corners and intersections.

.7 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.

.8 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 from Cash Allowance included in the Contract.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Masonry Anchorage and Reinforcement	Section 04 05 19
.2	Concrete Unit Masonry	Section 04 22 00
.3	Vapour Barrier	Section 07 26 00
.4	Expansion Control	Section 07 95 00

1.2 SUBMITTALS

.1 Submit colour charts to Consultant for colour selections.

PART 2 MATERIAL

2.1 MATERIALS

.1 Control joint filler: Blok-Lok "Exp-Joint", closed cell neoprene expansion joint material.

.2 Masonry flashing: membrane specified for through wall flashing at masonry walls; refer to Section 07 26 00.

.3 Mortar dropping collector: 25mm 50mm thick by 254mm high, dove-tail shaped, open mesh weave, fabricated from high density polyethylene Mortar Trap by Hohmann Barnard, Inc., or 50mm MortarNet by Mortar Net Solutions.

.4 Cavity weep hole vents: Blok-Lok "Cellvent" ventilator, Hohmann & Barnard QV-Quadro-Vent, or CellVent by Mortar Net Solutions, 9.5mm thick x 86mm deep x height of masonry units; colour to be selected by the Consultant to coordinate with masonry colour.

.5 Brick/Block vents:

.1 Extruded aluminum vents, min. 3.0mm thick 6063-T5 alloy, clear anodized finish, 100mm deep, overlapping blades at 45 with storm lip, continuous o weepage to bottom, complete with aluminum insect screen; similar to weather resistant louvres specified in Section 08 91 00. Sizes as indicated on mechanical drawings.

PART 3 - EXECUTION

3.1 INSTALLATION OF MASONRY ACCESSORIES

.1 Refer to Sections 04 21 00 and 04 22 00 for installation of masonry accessories.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Supply and installation of clay unit masonry, including accessories.

.2 Installation of products and materials supplied under other Sections, where indicated on drawings or specified.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Demolition	Section 02 40 00
.2	Masonry Mortar and Grout	Section 04 05 13
.3	Masonry Anchorage and Reinforcement	Section 04 05 19
.4	Masonry Accessories	Section 04 05 23
.5	Concrete block	Section 04 22 00
.6	Insulation	Section 07 21 00
.7	Vapour Barrier	Section 07 26 00
.8	Joint Sealants	Section 07 92 00
.9	Hollow Metal	Section 08 11 13
.10	Aluminum Windows	Section 08 51 13

1.3 REFERENCES

.1 CSA Group

.1	CAN/CSA-A82	Fired Masonry Brick Made From Clay or Shale
.2	CAN/CSA A179	Mortar and Grout for Unit Masonry.
.3	CAN/CSA A370	Connectors for Masonry.
.4	CAN/CSA A371	Masonry Construction for Buildings.
.5	CAN/CSA-A3000	Cementitious Materials Compendium

.2 Brick Industry Association

.1	Technical Note 18A	Accommodating Expansion of Brickwork.
.2	Technical Note 20	Cleaning Brickwork
.3	Technical Note 23	Stains - Identifications and Prevention
.4	Technical Note 28D	Brick Veneer/Concrete Masonry Walls

.3 Clay Brick Association of Canada, Technical Notes

.4 Canada Brick: CB1A: Cleaning Procedures for New Brickwork
CB3: Weatherproofing Masonry for Northern Climates

1.4 QUALIFICATIONS

.1 Masonry Subcontractor shall be a company specializing in commercial masonry work, with minimum five (5) years documented experience.

.2 Masonry work shall be executed under the continuous supervision and direction of a competent foreman.

.3 Perform masonry work to CSA-A371.

.4 Refer to Section 04 22 00 and comply with all items therein.

1.5 **SUBMITTALS**

.1 Submit, for approval, clearly labelled samples of materials to be used.
  .1 Obtain Consultant's final approval of brick samples prior to ordering materials and constructing the sample wall.

.2 Submit test reports for unit masonry.

.3 Submit shop drawings of all special shapes.

1.6 **SAMPLE WALL**

.1 Construct 2400mm high by 3000 long wall with 1200mm long corner return sample cavity wall, and one control joint. Construct wall on site where directed by the Consultant.

.2 Construct sample wall with specified materials to show colour range, texture, banding, bond, joint reinforcement, flashings, membrane flashings, cavity insulation, air vapour/barrier system, weepers, and mortar joints. Sample wall shall include all types of brick and block units specified for exterior walls, in patterns representative of the building elevations.

.3 Construct as many times as required to provide a wall to the satisfaction of the Consultant, before commencing masonry work. Remove rejected sample walls. Protect approved sample wall from damage and retain in place through duration of project until removal as directed by Consultant.

.4 Only masonry matching approved sample wall in all respects will be accepted for work of this project.

1.7 **STORAGE AND HANDLING**

.1 Ensure that sufficient brick has been ordered to complete project from a single production run.

.2 Any special shapes must be ordered in time to be manufactured with the main order of brick, to ensure colour consistency.

.3 Deliver masonry units to site, taking care to prevent damage. Lift skids with appropriate slings or forks, with protection to prevent damage. Protect corners and edges.

.4 Store masonry units on timbers or platforms, at least 75mm above grade, in such a manner as to prevent damage and staining of units. Cover to protect from weather.

.5 Do not use salt of calcium chloride to remove ice from surface of masonry.

.6 Split twin packs into single cubes before loading on to scaffold.

.7 Extra care should be used when handling smooth finished brick. Handle on wooden pallets.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Brick: Burned clay brick to CAN/CSA A82, Type FBX, Grade SW, as manufactured by Canada Brick, as follows:

.1 Masonry 1 (M1): Sonoma Matt, Metric Modular (90 x 57 x 190mm), common bond, full headers every 6th course.

.2 Masonry 2 (M2): Sierra Sandstone, Metric Modular (90 x 57 x 190mm), Common bond, full headers every 6th course (-10 inset).

.3 Masonry 3 (M3): Sierra Sandstone, Metric Modular (90 x 57 x 190mm), Soldier Course

.4 Masonry 4 (M4): Sonoma Matt, Metric Modular (90 x 57 x 190mm), common bond, full headers every 6th course., Tinted to match existing brick colour.

.5 Masonry 5 (M5): Existing brick to be tinted

.6 Refer to elevations for patterns and locations.

.2 Metal Anchors: Conforming to Ontario Building Code and Section 04 05 19.

.3 Vapour Barrier and Through Wall Flashing: Refer to Section 07 26 00.

.4 Weep Hole Vents: As specified in Section 04 05 23.

.5 Brick/Block Vents: As specified in Section 04 05 23.

.6 Cavity Wall Ties: As specified in Section 04 05 19.

.7 Mortar: As specified in Section 04 05 13.

.8 Mortar Net: As specified in Section 04 05 23.

.9 Special Shapes: as required including external corner soldier course bricks, colour and texture to provide exact match on all exposed faces to the face brick.

.10 Control joints for brick: Sealant and backing rod, with filler specified in Section 04 05 23.

.11 Brick Stain: Stain shall be the products of Nawkaw Corporation, or Perma Tint

PART 3 - EXECUTION

3.1 PREPARATION

.1 Co-ordinate all Work of this Section with applicable Masonry Sections.

.2 Coordinate installation of vapour barrier and insulation in cavity walls.

.3 Verify that site conditions are ready to receive work, before commencing work of this section.

.4 Verify that items specified in other sections are properly sized and located.

.5 Commencement of installation of unit masonry shall be construed as acceptance of site conditions.

.6 Note that the existing school will be in use until the Spring of 2023 and reclaimed brick will not be available until it is being demolished.

3.2 **INSTALLATION**

.1 Brickwork shall be as specified above and indicated on drawings.

.2 Mixing and blending: Mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.3 Co-ordinate all Work of this Section with the other masonry sections.

.4 Bond: Lay up exterior face brick generally in running bond. Provide Soldier course where noted on Drawings.

.5 Pointing: All exposed brick - Tooled - Concave.

.6 Tooling of joints shall consist of compressing mortar as the work proceeds with a non-staining (plastic or stainless steel) tool to produce a dense, perfectly flush or concave joint.

.7 Completely fill joints with mortar. This is a mandatory requirement. If inspection reveals that this requirement has not been met the complete masonry panel, partition or wall wherein the omission occurs shall be pulled down and rebuilt in accordance with this Specification at no additional cost to the Owner.

.8 Through Wall Flashing:
- .1 Supply and install through wall flashing in locations indicated.
- .2 Flashing must extend up wall a minimum of 410mm, 150mm higher than the top of the mortar net.

.9 Reinforcing:
- .1 Place reinforcing, as specified, at first mortar joint above flashing and immediately below top of walls.
- .2 Locate reinforcing minimum 400mm lengths at intermediate horizontal joints at openings to provide placement at 200mm intervals vertically.

.10 Mortar Droppings Collection Device:
- .1 Install one continuous row of the specified mortar net at base of walls and over all wall openings, directly on flashing.
- .2 Cavity width should match thickness of mortar net.

.3 Lay the first one or two courses of brick at flashing level, then install the mortar net continuously by placing it against the inside of the outer wythe, dovetail shaped section facing up, directly on the flashing at the base of the wall and over all wall openings. No fasteners or adhesives are required, and mortar need not have set.

.4 The mortar net may be cut as required to accommodate wall ties, conduit, plumbing, etc.

.5 If it is necessary to force the mortar net in to a cavity, ensure mortar has set sufficiently to resist outward pressure from the device.

.11 Weep Hole Vents:

.1 Install weep hole vents in exterior masonry immediately above dampproof courses including over doors and windows, at top of walls and elsewhere as shown or required to ensure cavity is vented at top and bottom.

.2 Place weep hole vents, as specified, at base of cavity walls, set in vertical joints located at maximum 600mm on centre.

.3 Place weep hole vents over lintels at same spacing.

.4 At top of cavity walls, locate vents at maximum 600mm centres. Vents shall generally be placed at second brick course below top of wall, or the first fully exposed brick course below the flashing; refer to drawings.

.5 Place vents at additional locations where indicated on drawings.

.12 Testing of Weeping Holes:

.1 Test weep holes with a minimum pour of 20 litres of water for each 3m length of cavity wall above level of flashing. Water should be pouring from each weep hole.

.2 Perform additional water tests in the presence of the Consultant at locations to be determined by the Consultant.

.3 Remedial work will be required for any sections of cavity wall which do not drain properly.

.13 Install brick vents where indicated on drawings.

.14 Provide control joints in brick wythe, at locations of control joints in concrete unit masonry back-up. Refer to section 04 22 00. Leave head joints at control joint locations free of mortar, ready for bond break and sealant. Refer to drawing detail. Horizontal reinforcement is to stop each side control joints; not continue through.

3.3 PROTECTION

.1 Cover the tops of all unfinished or unflashed masonry walls at the end of each day's work, to protect from weather. Maintain such protection as long as necessary and replace if removed or damage for any reason. Provide protective plastic sheeting, held in place with metal wall cover clamps.

.2 Protect brick work from staining. Cover brick with 6mil polyethylene sheets to protect brick finishes.

.3 Where brick colour is inconsistent due to production, or stained during construction, provide tinting of brick at no cost to Owner.

.4 Protect all adjacent materials (i.e, aluminum windows, metal cladding hollow metal frames etc.) from mortar droppings.

3.4 **CLEANING**

.1 Clean clay masonry units as work progresses.

.2 Do all cleaning at completion of work in conformance with Section 01 74 00.

.3 Point or replace defective mortar, as required or as directed by the Consultant.

.4 Clean clay unit masonry walls exposed in the finished work in accordance with manufacturer's recommendations and BIA Technical Notes #20.

.5 Repeat cleaning operations until work is satisfactory.

3.5 **TINTING OF NEW & EXISTING BRICK**

.1 As the new brick colour may not match the existing exactly, provide staining of new brick used as infill in the existing wall, where it will remain exposed in the wall. Provide tinting to existing bricks as indicated on drawings.

.2 Stain shall be applied with brush or roller to new or existing brick where indicated on drawings.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete and Masonry Reinforcement	Section 03 20 00
.2	Masonry Mortar and Grout	Section 04 05 13
.3	Masonry Anchorage and Reinforcement	Section 04 05 19
.4	Masonry Accessories	Section 04 05 23
.5	Loose Angle Lintels	Section 05 52 00
.6	Bench Supports	Section 05 52 00
.7	Building Insulation	Section 07 21 00
.8	Vapour Barrier	Section 07 26 00
.9	Joint Sealant	Section 07 92 00
.10	Expansion Control	Section 07 95 00

1.2 REFERENCE STANDARDS

.1 CSA Group:

.1	CAN/CSA-A165 Series	CSA Standards on Concrete Masonry Units
.2	CSA-S304	Design of Masonry Structures
.3	CAN/CSA-A371	Masonry construction for Buildings
.4	CAN/CSA-A370	Connectors for Masonry
.5	CAN/CSA-A3000	Cementitious materials compendium

.2 National Concrete Masonry Association

.1	NCMA TEK 10-2C	Control Joints for Concrete Masonry Walls - Empirical Method
.2	NCMA TEK-2A	Removal of Stains from Concrete Masonry
.3	NCMA TEK-3A	Control and Removal of Efflorescence
.4	NCMA TEK-4A	Cleaning Concrete Masonry

1.3 SUBMITTALS

.1 Submit duplicate samples of masonry units in accordance with Section 01 33 23.

.2 Construct sample panel of total exterior wall work, 1200 x 1800mm located on site where directed and showing use of reinforcement, through-wall-flashing, jointing, coursing, insulation, vapour barrier, mortar and inner and outer wythe materials.

.3 Submit Spec-Data Sheet on Grace Construction Products' Dry-Block System of Integral Water-Repellent Admixtures for Block and Mortar.

.4 Submit certification from manufacturer of exterior block that units shipped to site contain integral water repellent, added at appropriate rate.

.5 Submit certification from Masonry Subcontractor that only concrete block units containing integral water-repellant have been used in construction of the exterior face wall, and that the mortar used for these units also contained the specified water-repellant additive.

.6 Submit Technical Bulletin on Cleaning Masonry Containing Dry-Block.

1.4 **SAMPLE WALL**

.1 Construct 2400mm high by 3000 long wall with 1200mm long corner return sample cavity wall, as specified in Section 04 21 00.

.2 Construct 2400mm high by 3000 long wall with 1200mm long corner return sample cavity wall, and one control joint. Construct wall on site where directed by the Consultant.

.3 Construct sample wall with specified materials to show colour range, texture, banding, bond, joint reinforcement, flashings, membrane flashings, cavity insulation, air vapour/barrier system, weepers, and mortar joints. Sample wall shall include all types of masonry units specified for exterior walls, in patterns representative of the building elevations.

.4 Construct as many times as required to provide a wall to the satisfaction of the Consultant, before commencing masonry work. Remove rejected sample walls. Protect approved sample wall from damage and retain in place through duration of project until removal as directed by Consultant.

.5 Only masonry matching approved sample wall in all respects will be accepted for work of this project.

1.5 **EXTREME WEATHER REQUIREMENTS**

.1 During cold weather, lower than 5°C, when danger of freezing exists, heat all masonry materials using methods accepted in the industry and conforming to CAN/CSA-A371, and approved by the Consultants.

.2 Protect scaffolds from cold and wind with polyethylene or other barricades. Use heaters on the scaffolds where necessary to protect workmen and materials. PROVIDE PROTECTION WHENEVER NECESSARY TO PREVENT CESSATION OF WORK.

.3 During hot weather protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings. Wet units during hot drying weather so that mortar does not dry too rapidly. Units must be free of water adhering to their surfaces when they are laid. Conform to Hot Weather Requirements in CAN/CSA-A371.

1.6 **PROTECTION**

.1 Cover top of completed and partially completed wall not enclosed or sheltered, with water proof coverings at end of working day. Drape cover over wall and extend 600mm down both sides. Anchor securely in position with metal wall clamps.

.2 Protect adjacent surfaces from marking or damage due to masonry work.

PART 2 - MATERIALS

2.1 MATERIALS

.1 Concrete blocks:
- .1 to CAN/CSA-A165 Series, metric modular, Type H/20/A/M for foundations, Type H/20/A/M in concealed spaces, and H/20/D/M lightweight for exposed walls above grade.
- .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 Carboclave, 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 Carboclaved or 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 Water-Repellant Admixture:
- .1 Dry-Block Block Admixture, integral liquid polymeric water-repellent CMU admixture, manufactured by Grace Construction Products.
- .2 Supply the same product for adding to all mortar for exterior concrete unit masonry.

.5 Metal Anchors: Conforming to Ontario Building Code and Section 04 05 19.

.6 Through Wall Flashing: Refer to Section 07 26 00.

.7 Weep Hole Vents: As specified in Section 04 05 23.

.8 Block Vents: As specified in Section 04 05 23.

.9 Cavity Wall Ties: As specified in Section 04 05 19.

.10 Mortar: as specified in Section 04 05 13.

.11 Mortar Net: As specified in Section 04 05 23.

.12 Control joints: Sealant and backing rod, with filler specified Section 04 05 23.

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.

.3 All exterior concrete masonry units shall have Dry-Block integral water repellant.

PART 3 - EXECUTION

3.1 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 Extend vapour barrier at window, door, and louvre openings and at tops of walls for building in to frames and flashings as detailed.

.5 Build in frames and anchor bolts, and metal brackets for vanities, benches, and coat racks, etc.

.6 Coordinate with forces installing lateral support angles and acoustic insulation at the tops of non-load bearing masonry partitions.

3.2 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 or roof structure above, providing 25mm deflection clearance. Install lateral support angles, as specified in Section 05 52 00, and insulation filler as detailed.

.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 Isolate masonry from vertical structural steel framing in exterior walls using 6mm thick asphalt impregnated rigid board cemented to steel columns.

.8 Where new masonry abuts old or fully set masonry, clean existing surfaces and dampen if necessary to obtain bond.

.9 Evidence of non compliance with Contract Documents including the following will require replacement and/or repair:
- .1 Shrinking
- .2 Curling
- .3 Spalling
- .4 Poor color blend
- .5 Poor texture blend
- .6 Discolouration of mortar
- .7 Chipping

3.3 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, window sills, 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.

.9 All concrete block at parapets shall be filled solid. Install building paper and wire mesh reinforcing in the bed below solid fill.

3.4 MORTAR AND POINTING

.1 Mortar is specified in Section 04 05 13. Ensure that only mortar with Dry-Block admixture is used for exterior block work.

.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.

3.5 **BUILDING IN COMPONENTS**

.1 Build in door and window frames, steel lintels, sleeves, anchor bolts, anchors, nailing strips and other items to be built into masonry. Install windows using clip angles supplied by window manufacturer and co-operate with subcontractors installing windows, entrances and screens.

.2 Do not distort metal frames. Bed anchors of frames in mortar and fill frame voids with mortar or grout as wall is erected.

3.6 **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 where benches, shelves, cubbies, coat racks, J-hooks and other items are supported on walls;
- .3 behind wall-hung mechanical fixtures;
- .4 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.

3.7 **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.

.6 Control joints and bond breaker to be continuous from floor to roof, including any horizontal portions of a control joint. Review details with Consultant on site.

3.8 **EXPANSION JOINTS**

.1 Provide continuous expansion joints at building expansion joints, where indicated on drawings.

.2 Refer to Section 07 95 00 for expansion joint covers.

3.9 **HORIZONTAL REINFORCING**

.1 Refer to structural drawings for additional requirements for masonry reinforcing.

.2 Cavity wall and concrete block walls above and below grade shall be continuously reinforced and tied together with horizontal masonry reinforcing. Install reinforcing in at least every second block bed joint. Provide additional and special reinforcing where specified or indicated on drawings.

.3 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.

.4 Place continuous reinforcing in second bed joint below top of wall.

.5 Lap reinforcement minimum of 300mm at splices. Supply & install prefabricated sections at corners and intersection of walls to insure continuity of reinforcing.

.6 At exterior walls where coursing results in non-alignment of interior and exterior wythe horizontal joints, each wythe shall be reinforced in every second horizontal joint. Interior and exterior wythes shall be tied together with ties anchored to exterior face of interior block and vee wall ties laid into horizontal joints of exterior wythe.

.7 At 200mm high section of wall below window, tie masonry wythes together with stainless steel helical wall ties specified in Section 04 05 19, spaced at 400mm on centre across wall. Install ties in accordance with manufacturer's instructions. Ties to be installed after erection of wall section, into pre-drilled pilot holes. If ties are to be installed in vertical mortar joints during erection of wall, ensure ties remain level.

3.10 **FIRE-RATED INTERIOR PARTITIONS**

.1 Block shall be of density required to achieve fire rating, in accordance with the Ontario Building Code.

.2 At door 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.

3.11 **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 so as 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 drawings for locations and grout strength.

3.12 **THROUGH-WALL FLASHINGS**

.1 Install masonry flashing in locations where brick or block is bearing on foundation walls and elsewhere as indicated.

.2 Carry through-wall flashings minimum 150mm up backing material and turn top edge into joint or anchor top edge continuously. Keep flashing 12mm from exterior exposed face. Lap joints minimum 150mm.

.3 Lap and completely seal joints with adhesive to manufacturer's instructions. Bond flashing to vertical surfaces over whole area using flashing material manufacturer's recommended adhesive.

3.13 **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.

.4 Do not cut masonry within 25 metres of existing school.

3.14 **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.

3.15 **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.

3.16 **CAVITY WALLS**

.1 Coordinate with Insulation Trade to ensure that location of horizontal cavity wall reinforcing permits installation of cavity insulation without cutting (reinforcement to occur in joints of insulation board).

.2 Make provision for and clean out base of cavity on completion; every third block at base of cavity to be left out for cleaning and inspection. Do not insert blocks into opening until directed by the Consultant.

.3 Build in cavity wall reinforcing, as specified, at 400mm o.c. vertically at running bond locations and 200 mm o.c. at stack bond locations. Provide 600 mm lengths of additional reinforcing to intermediate mortar joints at openings and as required by Ontario Building Code, local By-Laws, and CAN/CSA-B370, Connectors for Masonry .

.4 The width of cavity wall reinforcing shall be fabricated to extend to within 25mm of the exterior face of the outer wythe and 25 mm of the interior face of the inner wythe. Do not crimp reinforcement to form drips.

.5 Reinforcement shall be placed at top of cavity wall flashings and at last mortar joint at top of walls in addition to the locations specified above.

.6 Refer to Section 07 21 00, Thermal Insulation, for application of cavity wall insulation. Install closure strips at cavity wall control joints, vertically and at bottom of wall openings. Closure strips to be continuous for full height of wall.

.7 Mortar Droppings Collection Device:
- .1 Install one continuous row of the specified mortar net at base of walls and over all wall openings, directly on flashing.
- .2 Cavity width should match thickness of mortar net.
- .3 Lay the first course of block at flashing level, then install the mortar net continuously by placing it against the inside of the outer wythe, dovetail shaped section facing up, directly on the flashing at the base of the wall and over all wall openings. No fasteners or adhesives are required, and mortar need not have set.
- .4 The mortar net may be cut as required to accommodate wall ties, conduit, plumbing, etc.
- .5 If it is necessary to force the mortar net in to a cavity, ensure mortar has set sufficiently to resist outward pressure from the device.

.8 Weep Hole Vents:

.1 Install weep hole vents in exterior masonry immediately above dampproof courses, including over doors and windows, at top of walls and elsewhere as shown or required to ensure cavity is vented at top and bottom.
.2 Place weep hole vents, as specified, at base of cavity walls, set in vertical joints located at between 400mm and 600mm on centre, to suit block size.
.3 Place weep hole vents over lintels at same spacing.
.4 At concrete masonry units at top of cavity walls, locate vents at between 600mm and 800mm centres, to suit block size. Where exterior masonry at top of cavity wall is clay brick, refer to Section 04 21 00.
.5 Place vents at additional locations where indicated on drawings.

.9 Install block vents where indicated on drawings.

.10 Maintain cavity free of mortar to ensure a continuous and uninterrupted 36mm wide air space between the insulation and masonry.

.11 Testing of Weeping Holes:
.1 Test weep holes with a minimum pour of 20 litres of water for each 3m length of cavity wall above level of flashing. Water should be pouring from each weep hole.
.2 Perform additional water tests in the presence Consultant at locations to be determined by the Consultant.
.3 Remedial work will be required for any sections of cavity wall which do not drain properly.

.12 Provide control joints in exterior masonry wythe, at locations of control joints in concrete unit masonry back-up. Leave head joints at control joint locations free of mortar, ready for bond break and sealant. Refer to drawing details. Horizontal reinforcement is to stop each side control joints; not continue through.

3.17 **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 efflorescence from masonry walls exposed in the finished work in accordance with manufacturer's recommendations and NCMA TEK Bulletin #8-3A.

.5 Remove dirt and stains from masonry walls exposed in the finished work in accordance with manufacturer's recommendations and NCMA TEK Bulletin #8-2A.

.6 Repeat cleaning operations until work is satisfactory.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Coordinate this work with the work of the steel joist supplier. Provide all necessary dimensions 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 BUT 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 ELSEWHERE**

.1 Grouting under base plates, Section 03 30 00.

.2 Supply of steel joists, Section 05 20 00.

.3 Steel deck, Section 05 30 00.

.4 Metal fabrications, Section 05 50 00.

.5 Fireproofing

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 30 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 Ravens Engineering Inc.will not be accepted as erection diagrams. If required, CAD diskettes of the structural plans are 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 Reviewed - Reviewed with no comments.
.2 Noted - Reviewed with comments noted on drawing. Submit final record 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 **SUBSTITUTIONS**

.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=345 MPa

.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 07 81 23 (Intumescent 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.

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 **LINTELS**

.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 precst 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.

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 weather tight 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 - EXECUTION

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 **FIELD 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

PART 1 - GENERAL

1.1 **GENERAL**

.1 Work Furnished And Installed

.2 Steel joists and steel bridging

.3 Field connections to concrete and masonry

1.2 **RELATED WORK SPECIFIED ELSEWHERE**

.1 Grouting under bearing plates, Section 03 30 00

.2 Structural Steel, Section 05 10 00

.3 Steel deck, Section 05 30 00

.4 Fireproofing

1.3 **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, 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, 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 A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength

.13 ASTM A325M, Standard Specification for Bolts for Steel, Heat Treated 120/105 ksi Minimum Tensile Strength

.14 ASTM A570/A570M, Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality

.15 SSPC, Steel Structures Painting Council

1.4 **QUALITY ASSURANCE**

.1 Steel joist fabrication shall be carried out by a firm that has been in business 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 Engage a Professional Engineer to be responsible for the design, detailing and installation of steel joists. 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.

.3 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.

.4 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.

1.5 **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.

1.6 **SHOP DRAWINGS**

.1 Refer to Section 01 30 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 and shop details. 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 diagrams.

.4 All shop drawings shall bear the seal and signature of the Professional Engineer responsible for designing the steel joists.

.5 The Professional Engineer designing the joists shall hold a Certificate of Authorization, and shall carry min. $1,000,000.00 in liability insurance.

.6 Submit joists design sheets and erection drawings. Indicate, in addition to the requirements of CAN/CSA 16.1, the loading for which joist have been designed, including concentrated loads required by OBC and CISC and wind uplift loading, location and size of bridging, joist spacing, joist bearing plates, framing of openings and slopes. Joist designs shall be stamped by a registered Professional Engineer licensed to practice in the Province of Ontario.

.7 Show on drawings: material specifications, member sizes, joint details, net weld lengths, section splices, bridging, loadings for each joist, and the seal and signature of the Professional Engineer who has designed steel joists. Show vent holes required for galvanizing process. Submit calculations for strength, deflection and camber.

.8 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.

.9 Provide the office preparing shop drawings with a complete set of Contract Drawings and Specifications plus all Addenda and Change Orders.

.10 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.

.11 After review, erection diagrams will be returned to the Contractor stamped to show one of the following:

.1	Reviewed	-	Reviewed with no comments.
.2	Noted	-	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.

.12 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.

.13 Keep on site at all times a set of shop drawings bearing the reviewal stamps of the Consultant and the Structural Engineer and use only these drawings and the Structural Drawings to erect. Neatly mark on the Structural Drawings changes issued during the course of construction.

1.7 **SUBSTITUTIONS**

.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.

1.8 SITE CONDITIONS

.1 Determine any potential interference with existing services and protect from disruption and damage.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Steel joists: CAN/CSA G40.21

.2 Arc welding electrodes and equipment: CSA W48.1. Electrode Classification Number: E480XX

.3 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.

.4 Machine bolts: ASTM A307

.5 Anchor bolts: CAN/CSA G40.21, Grade 300W

.6 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.

.7 Joint filler for exposed steelwork: Epoxy resin

.8 Shop primer paint for steel receiving finish coat of paint on site: CISC/CPMA 2-75 except no lead-based paints allowed. This includes intumescent paint.

.9 Shop paint for steel without finish coat: CISC/CPMA 1-73a except no lead-based paints allowed.

.10 Zinc-rich primer and touch-up paint:

.1 inorganic: CGSB 1-GP-171M, or

.2 organic, ready mixed: CAN/CGSB 1.181-92. Ensure compatibility with specified topcoat.

.11 Galvanizing: CAN/CSA G164

2.2 DESIGN OF STEEL JOISTS

.1 Design steel joists to conform to CAN/CSA S16.

.2 The Structural Drawings show the required depths of joists and their total service loading including dead load, live load and self weight. Loading diagrams are given for non-uniform loads and additional concentrated loads are noted where they occur. Apply live loads as full and partial loadings and any required point loads in accordance with CSA Standard CAN/CSA-S16.1, Loading for Special Open-Web Steel Joists.

.3 In addition to loadings given on the Structural Drawings, design joist top and bottom chords for an additional live load of one kN (225 lbs) applied as a point load anywhere along their length in combination with the other design loads.

.4 In addition to loadings given on the Structural Drawings, design joists for any pipe hanger loads resulting from piping 125 mm (5") in diameter or larger which runs parallel with the joists and for any other pipe hanger loads of one kN (225 pounds) or more. Refer to Mechanical Drawings for locations and obtain loadings from Contractor.

.5 Where joists support 76 mm deep composite steel deck, total width of top chord elements that actually support the deck shall be 140 mm minimum.

.6 Total load deflection shall not exceed 1/240th of the span and live load deflection not to exceed 1/360th of the span.

.7 All steel joists, and their bridging, bearings and anchorages, shall be designed by a Professional Engineer retained by the fabricator.

.8 Both joists and joist bridging shall, in addition to the requirements of this Section, satisfy the requirements of any Fire Rated Assembly Design specified for the Project.

.9 On request, submit calculations and such further proof as is necessary to show that the joists conform to the requirements of the Specifications. All documents shall carry the seal and signature of the responsible Professional Engineer.

.10 Design and fabricate joists in accordance with CAN/CSA S16 or CSA S136. Arrange members to form a statically determinate truss. Web and chord members shall have an axis of symmetry in the plane of the web.

.11 Minimum thickness of material shall be: flats and hot rolled sections 4mm (0.10"); rods 10mm (0.39") diameter; cold formed sections 2mm (0.079"); members supporting steel deck 3.15mm (0.125").

.12 Maximum slenderness ratio of tension web members of 1200mm (48") and deeper members shall be 240.

.13 Make all joists shoes with solid webs. Design joist shoes for rollover forces where shown on Structural Drawings.

.14 Chord member splices when used shall be staggered and shown on the shop drawings. Welding at each splice shall develop the section. Retain an independent testing agency to visually check all chord splices. The agency shall also undertake non-destructive testing of those chord splices, which occur in the middle half of the span and of each splice in web systems fabricated from bars. Arrange for the agency's reports to be reviewed by the Professional Engineer who has designed the joists and then submit these reports to the Consultant.

.15 Centre reaction point of joist framing from one side only over centroid of supporting beam. Where necessary, provide special shoe depths to suit the required elevations of the joist bearing surfaces.

.16 Arrange joists and bridging to accommodate recessed fixtures and ductwork. Refer to Mechanical and Electrical Drawings.

.17 Provide special framed clearway openings through joists where required for ductwork passing through joists. Refer to Mechanical Drawings. Design joists for any concentrated loads resulting from such openings.

.18 Line up web members along joist runs sufficiently to permit mechanical services set within the joist depths to be threaded through the joists.

.19 Provide ceiling extensions where required.

.20 Equipment and services hung from joists: Suspend vertical loads from top or bottom joist chords. Loads suspended from chords between any two adjacent panel points must not exceed 200 kg (440 pounds) total and must be connected to chords within 100 mm (4") of panel points. This condition may be waived if the total load between adjacent panel points does not exceed 50 kg (110 pounds). Loads must be applied so that they do not cause twisting of the joists or the joist chords. Attach by extending hanger rods between double angle chords where possible. Otherwise attach using only clamps or U-bolts. Do not cut or drill joist members. Lateral loads are not to be applied to joists.

2.3 CONNECTIONS TO SUPPORTS

.1 Design connections to conform to CAN/CSA S16 and clearly show on erection drawings.

2.4 ARCHITECTURALLY EXPOSED STEEL JOISTS

.1 Architecturally exposed steel joists consist of gymnasium.

.2 Make joists, which will be permanently exposed neat and uniform in appearance. The chord members, end panel chord lengths, shoes, web members and web arrangements of any one joist shall be identical in appearance to adjacent joists in the same enclosed space or room. Horizontal bridging lines shall be straight and neatly lapped and welded at joist locations. Cross bridging lines shall be straight and neatly bolted or welded to gusset plates at joists. The location and appearance of splices must be acceptable to the Consultant.

.3 As-fabricated straightness tolerances for members to be one-half of the standard camber and sweep tolerances.

.4 Make all copes, mitres and cuts in surfaces that are exposed to view with uniform gaps of 3 mm if shown as open joints or in reasonable contact if shown without gaps.

.5 Remove all imperfections, which are unsightly. Remove mill and shop marks including manufacturer’s identification marks. Remove all temporary attachments and grind smooth. Fill temporary holes with weld metal and grind smooth and flush.

.6 Provide continuous welding at exposed joints without gaps or fill between discontinuous welds with an epoxy resin filler, acceptable to the Consultant, finished to the same profile as the adjacent weld. Joints shall be weather tight and suitable for painting.

.7 Exposed welds shall be smooth. Grind flush all groove and plug welds

.8 Conceal connection bolts where possible. Orientate bolts in exposed bolted connections so that bolt heads are all on the more visually important side of the connection.

.9 Orient seams in hollow structural sections away from the more visually important sides of the members.

.10 Erection tolerances shall be one-half those normally permitted. Design connections to non-exposed steel to allow for adjustment during erection.

2.5 **FABRICATION**

.1 Conform to CAN/CSA S16 and CSA W59.

.2 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.

.3 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. Fill vent holes with weld material, grind smooth and touch-up with two coats of zinc-rich paint.

.4 Do not ship material to the site before it has been inspected.

2.6 **PLATES AND ANCHORS**

.1 Provide joists bearing on walls with bearing plates.

.2 Provide joists bearing on walls, which continue above with standard wall anchors, unless otherwise noted on the Drawings.

.3 Anchor roof joists to supporting walls with a minimum of two 16mm diameter x 380 long anchor bolts, unless otherwise noted on the Drawings.

.4 Weld joists to bearing plates unless otherwise noted on the Drawings.

.5 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.

.6 Extend joist shoes for full length of bearing plates.

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: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC-SP6 Commercial Blast Cleaning, to an average surface profile of 0.04mm (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 for which zinc-rich paint is specified

.3 Galvanized members

.4 Surfaces and edges to be field welded for a distance of 50 mm from the joint

.5 Contact surfaces of slip-resistant type joints assembled with high-strength bolts

.6 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 Apply galvanizing to:

.1 Exposed exterior steel joists

.2 Other steel joists noted on the Drawings

.8 When welding after galvanizing is in place, grind away galvanizing at areas to be welded. Touch up with two coats of zinc-rich paint.

.9 Apply primer paint to architecturally exposed surfaces without runs or sags. Sand down and repaint areas not acceptable to the Consultant.

PART 3 - EXECUTION

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 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.

3.3 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 in the shop and when erected. Store fabricated members in the shop so that they are accessible for inspection.

.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 Shop 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 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 Shop paint including surface preparation.
.10 Galvanizing.

.7 Arrange for the inspector to be present during the shop welding of 10% 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 See Section 05 10 00 for field inspection requirements.

3.5 **FIELD 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 See Section 05 10 00

3.7 **DRILLED ANCHORS**

.1 See Section 05 10 00.

3.8 **SUSPENDED LOADS**

.1 Suspend vertical loads from top or bottom joist chords. Loads suspended from chords between any two adjacent panel points must not exceed 200 kg (440 pounds) total and must be connected to chords within 100 mm (4") of panel points. This condition may be waived if the total load between adjacent panel points does not exceed 50 kg (110 pounds). Loads must be applied so that they do not cause twisting of the joists or the joist chords. Attach by extending hanger rods between double angle chords where possible. Otherwise attach using U-bolts with double hangers or other devices that will centre the hanger load on the joist. Do not cut or drill joist members. Lateral loads are not to be applied to joists.

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

PART 1 - GENERAL

1.1 WORK FURNISHED AND INSTALLED

.1 Steel roof deck

.2 Acoustic steel roof deck

.3 Steel floor deck

.4 Holes for other trades

.5 Hole and edge reinforcing fastened to deck

.6 Closures and cover plates

.7 Sheet metal edge forms for concrete

.8 Other sheet metal items noted on the structural drawings to be provided by this Section.

1.2 WORK FURNISHED BUT NOT INSTALLED

.1 Glass fiber batts for acoustic deck

1.3 RELATED WORK SPECIFIED ELSEWHERE

.1 Structural Steel, Section 05 10 00.

.2 Steel Joists, Section 05 20 00.

1.4 REFERENCES

.1 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members.

.2 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.

.4 CSA W59, Welded Steel Construction (Metal Arc Welding).

.5 ASTM A108, Standard Specification for Steel Bars, Carbon and Alloy, Cold Finished.

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

.7 ASTM A792/A792M, Standard Specification for Steel, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.8 CSSBI 10M, Standard for Steel Roof Deck.

.9 CSSBI 12M, Standard for Composite Steel Deck

.10 CSSBI B13, Design of Steel Deck Diaphragms

.11 Factory Mutual Loss Prevention Data 1-28, Wind Loads to Roof Systems And Roof Deck Securement.

1.5 **QUALITY ASSURANCE**

.1 Welding shall be performed by a firm certified by the Canadian Welding Bureau under the requirements of CSA W47.1. Welders shall be qualified for deck welding by the Canadian Welding Bureau.

.2 Before the start of fabrication, supply the Consultant and the independent inspection agency with mill test reports properly correlated to the materials. The onus for proving the properties of the steel supplied rests with the Contractor.

1.6 **SHOP DRAWINGS**

.1 Refer to Section 01 30 00 – Submittals. "Shop drawings" means erection diagrams. Shop drawings received after noon will be date-stamped as received the following working day.

.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 Submit copies of manufacturer's data sheets for each deck type.

.4 If required, CAD diskettes of the structural plans are 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.

.5 Show on drawings: material specifications, sheet lengths, inverted deck locations, thicknesses, local reinforcement, field fastening.

.6 All shop drawings shall be signed and sealed by a professional engineer registered in Ontario.

.7 Review of shop drawings by the Consultant and the 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 receipt of the reviewed drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the Contract price.

.8 Provide the office preparing shop drawings with a complete set of Contract Drawings and Specifications plus all Addenda and Change Orders.

.9 Make corrections required by previous review before resubmitting drawings. Do not add new details to drawings which have been reviewed.

.10 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 final record print as soon as corrections are made.
.3	Resubmit	-	Correct and resubmit for review prior to fabrication.

Conform to the requirements of each authority that has reviewed the drawings.

.11 Allow a minimum of 10 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.

.12 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 steel deck. Neatly mark on the Structural Drawings changes issued during the course of construction.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Deck: ASTM A653/A653M, Grade 230, Zinc-Iron Alloy Coating ZF75, or ASTM A792/A792M, Grade 230, Aluminum-Zinc Alloy Coating AZ150.

.2 Powder-actuated fasteners: Hilti Decking Fastening System.

.3 Zinc-rich paint - organic, ready mixed:
- .1 Galvafroid by W. R. Meadows Ltd.
- .2 Glid-Zinc 100 by Glidden Company (Canada) Ltd.

.4 Glass fibre insulation: Density 17 kg per cubic metre (1.1 pounds per cubic foot), shaped to profiles of flutes.

.5 Galvanized Deck (see drawing for locations): ASTM A653/A653M, Grade 230 Zinc coating Z275, or ASTM A792/A792M, Grade 230, Aluminum-Zinc Alloy Coating AZ150.

.6 Acoustic Deck shall be Peerless P-156A or approved equal, completed with acoustic insulation. Acoustic Deck shall be pre-painted to colour selected by the Architect.

.7 Coated Fasteners for galvanized deck and prefinished deck; Buildex Division, Canada ITW Ltd. Climaseal coating, encapsulated EPDM washer, self-drilling screw. 12-24 x 7/8" Hex Washer Head Traxx/4 (total thickness 6mm). 12-24 x 1/4" Hex Washer Head Traxx/5(total thickness 12mm).

2.2 **DESIGN**

.1 Conform to requirements on drawings and in specifications and to Factory Mutual FM Class 90 approval rating requirements.

.2 Conform to CSSBI 10M and 12M where applicable unless otherwise required by drawings and specifications.

.3 Design deck profiles for indicated loads in accordance with CSA S136. Section depths and minimum steel thicknesses are shown on the Drawings. Deck to have interlocking male and female side laps.

.4 Design deck for indicated diaphragm action, including deck thickness, anchorage and side laps, in accordance with CSSBI “Design of Steel Deck Diaphragms” and Hilti Product Technical Guide (for Powder Actuated Fasteners). If no diaphragm shear is indicated on drawings, design deck for shear of 5.0 kN/m.

.5 Roof deck: Rib spacing, centre to centre, shall be 150 mm for 38 mm roof deck and 150 mm or 200mm for 76mm roof deck, unless otherwise noted.

.6 Floor deck: Rib spacing, centre to centre, shall be 150 mm for 38 mm floor deck and 300 mm for 76 floor deck unless otherwise noted. All floor deck shall be composite.

.7 Deck profiles and welding shall, in addition to the requirements of this Section, satisfy the requirements of any Fire Rated Assembly Design specified for the Project.

.8 Limit deflection of roof deck under total load to 1/240th of span. Also limit deflection to that required by Factory Mutual for a person walking on the roof.

.9 Limit deflection of floor deck under live load to 1/360th of span.

.10 Limit long-term deflection of composite deck to 1/480th of span.

.11 Make sections continuous over 3 spans or increase thickness of material to give the equivalent stiffness and strength of a 3-span deck.

.12 Design anchorage of roof deck to supports to resist net factored uplift forces of 3 kPa on cantilevers and at all roof corners (6m x 6m areas) and 2 kPa elsewhere on 3m wide strip around perimeter of all roof areas, but not less than that shown on the drawings or required by Factory Mutual. Increase minimum welding specified under Erection if necessary.

.13 Provide side lap connections, which distribute vertical loads between panels and also horizontal loads when acting as a diaphragm.

2.3 FABRICATION

.1 Conform to CSA S136 and CSA W59.

.2 Fabricate sections from steel sheets by rolling. Form integral ribs which will bear on supports and form interlocking male and female side laps.

.3 Cellular units: Spot weld together upper and lower elements assembled into a cellular unit so as to develop the full horizontal shear along the length of the interface.

2.4 ACCESSORIES

.1 Provide all required edge stiffeners, closures, reinforcing sheet steel plates and flashing.

.2 Reinforce edge of free spanning deck with channel shaped closure fitted to edge and fastened to deck.

.3 Provide flashing at columns and points of discontinuity to prevent leakage of mortar when concrete is placed over deck.

.4 Provide edge forming for concrete slabs over deck. Fasten to deck.

2.5 **CLOSURES**

.1 Provide fitted steel closures to fill hollow spaces between webs immediately above beams, partitions and walls transverse to deck when a ceiling is not specified. Where deck is continuous over support provide closures on each side and pack between closures with glass fibre insulation. Where deck span is parallel to walls and partitions, install steel flashings to provide a neat juncture.

.2 Provide both interior and exterior fitted steel closures where deck cantilevers over exterior walls. Pack between closures with glass fibre insulation.

.3 Provide fitted steel closures to fill hollow spaces between webs below all roof top sleepers or mechanical unit or skylight supports.

2.6 **OPENINGS**

.1 Structural Drawings do not show all openings required. Refer also to Architectural, Mechanical, and Electrical Drawings.

.2 Cut all required openings in steel deck and reinforce openings larger than 150mm.

.3 Openings up to 150 mm wide across the flutes require no reinforcing. Minimum clear distance between unreinforced openings shall be 600 mm.

.4 Reinforce roof openings 150 to 300 mm wide across the flutes. Use 55 x 55 x 6 mm angle under the flutes at each end of the opening. Extend across at least three flutes on each side. For openings over 300 to 400 mm across the flutes, provide suitable reinforcement based on a structural analysis of the loads involved. Roof openings larger than 400 mm wide across the flutes will be framed by the Structural Steel Trade.

.5 Reinforce openings through floor deck as specified for roofs but the maximum size of reinforced openings shall be 300 mm x 300 mm. Larger openings will be framed by the Structural Steel Trade.

2.7 **ACOUSTIC DECK**

.1 Provide 3 mm diameter holes on 10 mm staggered centres in a continuous band on all vertical ribs. Provide a noise reduction coefficient of 0.7.

.2 Supply preformed glass fibre insulation for installation by the Roofing trade. Insulation shall fill flutes in the top of the deck.

.3 Acoustic Deck shall be pre-painted to colour selected by the Architect.

2.8 **COMPOSITE DECK**

.1 Provide data to substantiate the load capacity of composite deck when requested. Design shall have been undertaken by a Professional Engineer and load testing certified by an independent inspection agency.

.2 Form sections to produce section moduli and moments of inertia not less than those in the published data of the manufacturer. Embossments shall ensure a composite unit of steel and concrete acting together to provide the required strength and stiffness.

.3 Design deck as a form in accordance with CSSBI 12M.

PART 3 - EXECUTION

3.1 **CONSTRUCTION REVIEW**

.1 General Review During Construction by the Consultant and Structural Engineer 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. It will be carried out by examination of representative samples of the Work.

.2 The Contractor will receive copies of the construction review reports. 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 the Work.

.2 Cut and reinforce openings required by other trades.

.3 Do not hang concentrated loads from the steel deck. Attach hangers, which support services to the steelwork.

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. Assist the agency in its Work.

.2 Pay for cost of inspection from the Cash Allowance.

.3 Work will be inspected when erected.

.4 The agency will submit reports to the Consultant, Structural Engineer, and Contractor covering the Work inspected and provide details of defects or deficiencies observed.

.5 Inspection will include:
- .1 Checking that mill test reports are properly correlated to materials
- .2 Checking welders' CWB certification
- .3 Checking deck types and gauge thicknesses
- .4 Checking all welding, fastening and button punching
- .5 Checking of all reinforcement required at holes cut in deck
- .6 Checking installation of sheet metal strips and edge reinforcing

3.5 **FIELD 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 Carry out erection using only the forces of the steel deck fabricator unless written permission is obtained from the Consultant prior to the close of Bids to sublet the erection.

.2 Align deck end to end for accurate fit with corresponding sections. Ensure that sections are parallel, even and straight.

.3 Protect members supporting deck from damage when deck is being welded in place. Report damage to the trade that has provided the member and establish with that trade a procedure for repair or replacement. Obtain the acceptance of the Consultant before starting remedial measures.

.4 Weld deck to supports to resist uplift and lateral forces but not less than using at all bearing points with 20 mm diameter fusion welds in alternate flutes, unless otherwise noted on drawings. Stagger welds along flanges of supporting members to the maximum obtainable by the width of the flange. Place one weld each side of side lap, in each flute where side lap is made. Increase weld size and spacing as required.

.5 Provide min. 45mm bearing on all supporting members

.6 Locate a rib of deck directly over steel beams and perimeter angles spanning parallel to deck and at same elevation as deck support. Weld deck to beam or angle at 450 mm centres.

.7 Make end laps over supports lapping not less than 50 mm and not more than 100mm.

.8 Provide adequate connection to withstand all forces, including uplift, asting on the deck during erection.

.9 Prefinished metal deck shall be fastened through the low rib to all supporting members with Hilti direct fasteners (Type X-ENP-19-L15). Fasteners shall be placed in outside rib on both sides of deck unit and in every rib in between to supporting member transverse to the rib and at 450 mm max. To supporting members parallel to the rib. Side laps to be mechanically fastened at 610mm max.

.10 Field welding to conform to requirements of CSA - W59.

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.11 For exposed deck end laps, ensure that lower deck sheets do not extend past the face of the supports.

.12 Connect male and female side laps by welding or mechanically interlocking with a button punch at 600 mm on centre maximum including at supports. Reduce spacing as required for diaphragm action or if the ULC Fire Rated Assembly design specified requires a closer spacing..

.13 Increase deck welding specified elsewhere if necessary to satisfy the requirements of any Fire Rated Assembly Design specified for the Project.

.14 Inspect all surfaces of deck after erection and touch-up with zinc-rich paint where protective coating has been scratched or damaged. Minimum thickness 0.06 mm (2.5 mils).

3.7 **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

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete Unit Masonry	Section 04 22 00
.2	Structural Steel	Section 05 10 00
.3	Finish Carpentry	Section 06 20 00
.4	Built-up Roofing	Section 07 51 00
.5	Painting	Section 09 90 00
.6	Mechanical	Divisions 21, 22, 23, 25
.7	Electrical	Divisions 26

1.2 REFERENCE STANDARDS

.1 CSA Group:

.1	G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel
.2	CSA G164	Hot dip galvanizing of irregularly shaped articles
.3	CSA W55.3	Certification of companies for resistance welding of steel and aluminum
.4	CSA W59	Welded Steel Construction (Metal Arc Welding)
.5	CSA W47.1	Certification of companies for fusion welding of steel
.6	CSA S16	Design of Steel Structures

.2 ASTM International:

.1	ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
.2	ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
.3	ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Hardware
.4	ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 01 33 23.

.2 Shop drawings for shall be stamped by a professional structural engineer, registered in the Province of Ontario, retained by the Contractor, who shall be responsible for the structural design of metal fabrications.

.3 Indicate field dimensions on shop drawings.

.4 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.

1.4 **FABRICATION**

.1 Design, fabricate and erect structural steel members in accordance with CAN/CSA-SI6.1.

.2 All steel to be installed in masonry or concrete, or for exterior exposure, must be hot dipped galvanized after fabrication. This includes threaded bolts, and other fasteners.

1.5 **INSPECTION AND TESTING**

.1 The Owner will appoint a Testing and Inspection Company who shall ensure that the deflection and lateral support angles for non-loadbearing masonry walls have been securely anchored to wall and to structure above.

.2 The cost of this testing and inspection shall be paid through the Cash Allowance included in the Contract; refer to Section 01 10 00.

.3 Contractor shall cooperate with inspectors and provide full access to all places where the work is being performed.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1	Structural Steel:	to CAN/CSA - S161.1; CAN/CSA-G40.20/G40.21.
.2	Welding Materials:	to CSA W59, CSA W55.3 for steel and aluminum
.3	Sheet Steel:	wiped coated, ASTM A653; structural quality Grade A or B, maximum permissible working stress, Grade A 137,895 kPa, Grade B 154,442 kPa.
.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	Reflective Tape:	3M Diamond Grade Fluorescent Yellow Conspicuity Markings; 50mm wide fluorescent, retroreflective tape for exterior applications.

.12 EPDM Gasket: Continuous gasket fabricated of 19mm thick, by minimum 19mm wide, 40 durometer EPDM flat cord, as manufactured by Budlar Flexible Products Inc., or approved equivalent.

.13 Bolts and anchors bolts: to ASTM A307-82A.

.1 Supply angles, bolts, anchors, sleeves and any other attachments to structure necessary for the installation of work under this Section.

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. Galvanize all interior steel items to be embedded in concrete or masonry. Do all galvanizing after welding.

.11 After installation, remove any rust and touch up all galvanized work with two coats zinc rich coating.

.12 Finish painting is specified in Section 09 90 00.

3.2 **SUPPORT STEEL**

.1 Provide and install miscellaneous structural steel supports and any other steel fabrications required for the following items:

Entrances and Screens
Galvanized steel angles and bent plates at parapets.

3.3 **LATERAL SUPPORT FOR MASONRY**

.1 Provide deflection and lateral support angles for non-loadbearing masonry walls in accordance with Section 04 22 00. Install on both sides of wall.

.2 Lateral support noted below is a minimum requirement; provide lateral support as indicated on structural drawings where it exceeds these requirements.

.3 For interior walls with concealed tops parallel with joists provide steel angles 90mm x 90mm x 6mm x 800mm long on both sides of wall, at maximum1800mm o.c. Anchor angle to underside of structure with suitable inserts and bolts.

.4 Where wall is directly below joist, provide steel angles 90mm x 90mm x 6mm x 800mm long at 1800 o.c. welded to bottom cord of joist on each side of wall. Coordinate with forces providing drywall enclosure at joist above wall.

.5 For interior walls with concealed tops perpendicular to joists, provide 75mm x 50mm x 6mm L x 100mm long, welded to bottom chord of each joist.

.6 For interior walls with exposed tops provide 75mm x 75mm x 6mm continuous steel angles. Anchor angles in an approved manner.

.7 Coordinate with forces installing acoustic insulation in gaps at top of partitions, to ensure insulation is installed before lateral support angles.

3.4 **BOLLARDS**

.1 Supply and install galvanized steel bollards as shown on Drawings. Bollards shall be 150mm x 9.5mm thick wall x 3100mm, seamless steel pipe. Install 1600mm into a concrete foundation and extend 1500mm above grade. Fill bollard with 25 MPa concrete and round top. Round top of footing also. Apply prime coat, ready for finished painting.

.2 Where noted, provide sleeved removable bollards with brackets and holes to permit post to be secured in place by padlock.

3.5 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

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete formwork	Section 03 30 00
.2	Structural Steel	Section 05 12 10
.3	Finish Carpentry	Section 06 20 00
.4	Custom Cabinets	Section 06 41 13
.5	Plastic Laminate Work	Section 06 41 19
.6	Built-Up Roofing	Section 07 51 00
.7	Hollow Metal Doors and Frames	Section 08 11 13
.8	Door Hardware	Section 08 71 00
.9	Painting	Section 09 90 00
.10	Electrical	Division 26

1.2 REFERENCES

.1 CSA Group:

.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.

.2 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 all veneer play; 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.

.3 Plywood over steel deck at canopies shall be 19mm thickness, waterproof, tongue and grooved ply.

.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/m^2 (ASTMA153 Class A or B1 G185)
.2 connectors meeting CAN/CSA-G164 minimum zinc coating of 600 g/m^2 (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.
- .6 Retaining walls.

.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:
- .1 Fasten wood cant blocking to structure with 19 mm. dia. bolts 760mm o.c.
- .2 Fasten curbs as indicated.
- .3 Wood cants, curbs and copings to be preservative treated. Plywood to be exterior grade.
- .4 Coordinate dimensions of curbs with manufacturer of pre-manufactured curb caps.

.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.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 All finished wood items and trim, other than custom cabinetry, shown on drawings.

1.2 RELATED WORK

.1	Demolition & Alterations	Section 02 40 00
.2	Metal Fabrications	Section 05 52 00
.3	Rough Carpentry	Section 06 10 00
.4	Architectural Casework	Section 06 41 13
.5	Plastic Laminate Work	Section 06 41 19
.6	Painting	Section 09 90 00

1.3 DELIVERY AND STORAGE

.1 Protect materials against high humidity and moisture at all times.

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 - 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: 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 clear maple, suitable for clear finish

.5 Douglas Fir plywood: all veneer ply; comply with CSA Standard 0121, COFI Exterior. Exposed two sides shall be grade G2S, and exposed one side shall be grade G1S

.6 Canadian Softwood Plywood : all veneer ply; comply with CSA Standard 0151, COFI Waterproof glue WSP. Exposed two sides shall be grade S2S, and exposed one side shall be grade S1S.

.7 Wood Particleboard:

.1 fabricated from 100% recycled or recovered wood fibre, containing no added urea formaldehyde, and certified by the Forest Stewardship Council (FSC). Conform to ANSI A208.1/Grade M-2, with formaldehyde emissions of 0.09 ppm or less.

.2 Particleboard shall be ultra low emission formaldehyde product; NU Green 2 Particleboard as manufactured by Uniboard, ZCore as manufactured by Panolam Industries, TafiLam-Eco as manufactured by Tafisa Canada, or Duraflake Vesta ULEF particleboard as manufactured by Arauco.

.8 Hardwood plywood : all veneer ply conforming to CSA 0115 and AWMAC. Birch or maple ply for stain finish, where noted on drawings.

.9 Plastic Laminate: As specified in Section 06 41 19, wood pattern with light woodgrain finish, to later selection by Consultant.

.10 Reveals:
- .1 Clear anodized aluminum channel reveals by Fry Reglet
  - .1 Model MWC7550, 12.7mm wide channel reveal with return keys
  - .2 Model MWCOSC75 outside corner reveal with return keys
- .2 Depth of reveals to be as required to suit finished panel depth.

.11 Fasteners:
- .1 Wood screws: electroplated, to CSA-B35.4
- .2 Nails and Staples: to CSA-B111

.12 Adhesive:
- .1 Waterproof synthetic resinous glue, of approved type for general carpentry work, low VOC emitting.
- .2 Adhesives shall be free of urea formaldehyde.

.13 Finish:
- .1 As specified in Section 06 42 13
- .2 Stain to be top quality, compatible with finishing system, in colours to be selected by the Consultant.

.14 All steel furring and framing shall conform to the specifications of Section 09 22 00.

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 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.

3.3 **WOOD TRIM**

.1 Supply and install all wood trim where shown on drawings and details including, but not limited to control panels, filler panels, benches, cubbies, etc..

3.4 **FINISHING**

.1 Finish wood generally in accordance with the specifications for casework in Section 06 41 13.

.2 Wood to be for clear finish, unless otherwise indicated in specifications or on drawings and schedules.

.3 Where staining is required, stain colour will be selected by the Consultant to match plastic laminate or other adjacent finish as applicable.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Metal Fabrications	Section 05 52 00
.2	Rough Carpentry	Section 06 10 00
.3	Plastic Laminate Work	Section 06 41 19
.4	Door Hardware	Section 08 71 00
.5	Glazing	Section 08 81 00
.6	Resilient Base	Section 09 65 00
.7	Painting	Section 09 90 00
.8	Plumbing	Division 22
.9	Electrical Work	Division 26

1.2 QUALIFICATIONS

.1 The Work of this Section shall be provided by a specialist millwork firm established in Ontario for a minimum of five years and able to produce evidence of satisfactory completion of quality casework comparable with Work specified under this Section.

.2 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.

1.3 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.

1.4 SUBMITTALS

.1 Submit Shop Drawings of all finish carpentry and in accordance with Section 01 33 23.

.2 Draw Shop Drawings in related and/or dimensional positions with sections. Scale minimum 1:10.

.3 Shop Drawings shall show fabrication details, materials, jointing, description of anchorage and 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 electrical connections to this work.

.4 Submit product data for all finishes.

.5 Submit samples of materials, construction method and wood stain finish for Consultant's approval.

.6 Submit samples of all hardware.

.7 Submit one full size sample of proposed units of Type selected by Consultant prior to proceeding with the remainder of cabinet work.

1.5 **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 this Work, and report to Consultant any such work not done properly.

1.6 **OWNER'S APPLIANCES (IF APPLICABLE)**

.1 Confirm the standard appliance dimensions with the OWNER prior to fabrication:

1.7 **MEASUREMENTS**

.1 Take necessary measurements at the Building of spaces and conditions to which work must conform or through which access is required. Take such measurements prior to fabrication of the Work of this Section and in ample time to avoid delays in the Work.

1.8 **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 damage of any kind.

1.9 **WARRANTY**

.1 Provide an extended Warranty to the General Conditions of the Contract to **two (2) years** from date of Substantial Performance of the Contract.

.2 The warranty shall cover replacing, reworking and/or refinishing to make good defects in architectural 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 All wood must be straight and true, dressed 4 sides and conform to details. It must conform to official grading rules of Canadian Lumberman's Association for quality and moisture content. It must conform to NBC Structural requirements and be grade stamped according to CSA Standards 0140 or 0151. Stained woods and plywoods must be selected for colour and grain uniformity.

.2 All materials shall be low VOC products.

.3 Softwood Lumber: Conform to CAN/CSA 0141 and National Lumber Grades Authority requirements.

.4 Hardwood Lumber: Conform to National Hardwood Lumber Association (NHLA) requirements. Maple for clear finish to AWMAC Premium Grade.

.5 Hardwood Plywood:
- .1 Conform to CSA 0115 and AWMAC.
- .2 Maple veneer plywood for clear finish; exposed faces to be natural grade per AWMAC.
- .3 Interior of cupboard and closet doors to be classified as exposed faces.

.6 Canadian Softwood Plywood: Veneer plywood conforming to CSA 0151.

.7 Douglas Fir Plywood: Veneer plywood conforming to CSA 0121.

.8 Poplar Plywood: Veneer plywood conforming to CSA 0153.

.9 Wood Particleboard:
- .1 fabricated from 100% recycled or recovered wood fibre, containing no added urea formaldehyde, and certified by the Forest Stewardship Council (FSC). Conform to ANSI A208.1/Grade M-2, with formaldehyde emissions of 0.09 ppm or less; .
- .2 Particleboard shall be ultra low emission formaldehyde product; NU Green 2 Particleboard as manufactured by Uniboard, ZCore as manufactured by Panolam Industries, TafiLam-Eco as manufactured by Tafisa Canada, or Duraflake Vesta ULEF particleboard as manufactured by Arauco.

.10 Hardboard: Conform to CGSB 11-GP-3M.

.11 Nails and Staples: Conform to CSA B111.

.12 Plastic Laminate: Plastic laminate materials and work shall conform to Section 06 41 19.

.13 Glue:
- .1 Waterproof synthetic resinous glue, of approved type for general carpentry work and thermo-setting type for plastic laminate work, low VOC emitting.
- .2 Adhesives shall be free of urea formaldehyde.
- .3 All adhesives to conform to CSA 0112 Series.

.14 Wood Finish:
- .1 Typical wood finish:
  - .1 Premium Grade, AWS System 9, UV curable, acrylated epoxy, polyester or urethane; semi-gloss.
- .2 System shall consist of stain (where noted), sealer and transparent top coat
- .3 The individual components of the system used must be chemically compatible to assure perfect adhesion and a top quality, durable final finish.
- .4 Stain to be of colour as later selected.
- .5 Refer to item Furniture Finishing (Wood) subsection, below.

.15 Wood Doors:

.1 All tall cupboard doors shall be 38mm solid wood core, plastic laminate veneered, heavy duty, flush slab doors.

.2 Doors to have minimum 16mm solid hardwood edges, to match face of door, minimum 107mm stiles, 85mm rails, and min 2mm hardwood veneer crossband. Glues shall be urea-formaldehyde-free.

.3 Hollow Core Doors to have honeycomb core.

.4 Solid Core Doors to have urea formaldehyde-free solid mat formed particle board core, density 449kg/m^3, conforming to CSA-O188.

.5 Doors to be as manufactured by Baillargeon Door Inc., Masonite, Lambton Doors, JWS Manufacturing Inc., or VT Industries.

.16 Linear Grilles:

.1 Nailor Industries linear bar grille, model 49-240-E-SA-C-MM, in sizes and capacities shown on drawings and in conformance with mechanical air flow schedules.

.2 Provide alignment strips for linking continuous sections.

.3 Frames to be narrow profile, extruded aluminum with satin anodized finish, with concealed fasteners.

.4 Provide all fasteners.

.5 Provide linear grilles at countertop in new bookcase in Existing Kindergarten 121.

2.2 CABINET 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. Proposed substitutions must be equal or better quality than the specified items and will be considered at the Consultant's discretion. Hinges must be as specified.

.2 Furnish and install all hardware to custom millwork as follows:

Hardware for 19mm thick cupboard doors			Finish
Hinges	Richelieu	Clip Hinge 170°, self closing	619
Roller Catches	Richelieu	807V	603
Pulls	CBH	220 x 89, stainless steel	630
Cupboard Deadbolt Lock	CCL Security	650/651, straight cam	C26
Strike Plates	CCL Security	12S, bottom slot	
Elbow Latch & Strike	Richelieu	BP5540180	Nickel
Hardware for drawers			
Slides	Knape & Vogt	8505 (length to suit)	Zinc
Pulls	CBH	220 x 89mm, stainless steel	630
Drawer locks	CCL Security	650/651, offset cam	C26

Hardware for drawers

Strike Plate	CCL Security	12S, slot	

Hardware for Adjustable Wood Shelves

Pilaster Strips	Knape & Vogt	255 ZC Steel	Zinc
Shelf Clips	Knape & Vogt	256 ZC Steel	Zinc

Hardware for 38 mm thick cupboard doors			Finish
Hinge	Stanley	F179 114x102	619
Locksets	Lockset Complete with Interchangeable Cylinder by Finishing Hardware Supplier		Supplied
Closet rods & flanges	Knape & Vogt	660 SS 30mm OD rod 730 end caps 734 & 735 end supports 760 intermediate support	629 ANO CHR ANO
Roller Catches	Richelieu	504XV	625
Surface Bolts	Richelieu	392	646
Door Stop/Holder	Rixson	"Checkmate" 10 Series Adjust. Standard Duty Surface Mounted	630
Coat Hooks (2 / Teachers Closet)	Ives	571, cast brass, Coat & Hat Hook	626

.3 Supply and install additional hardware as follows:

.1 Coat Hooks: Ives 571 (Staff areas only)

.2 Safety Coat Hooks: Frost Model 1150, Kindergarten Cubbies (2 per cubbie) in colour to be selected by the Consultant from manufacturer's standard range

.4 Provide locks on doors and drawers as follows:
- .1 Classroom, Kindergarten, Instructional Rooms Teacher's Closets AND 50% of uppers and lowers
- .2 Install locksets at all tall cupboards with 38mm wood doors, as supplied by door hardware subcontractor.

.5 Keying:
- .1 All locks in a room to be keyed alike.
- .2 Provide 6 extractor keys.

2.3 **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 the furniture 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 Resilient base around all toe spaces is specified in Section 09 65 00.

2.4 **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. veneered particle board, tongue and grooved to solid framing members. Provide minimum 6.4mm thick solid wood edging at all exposed edges.

.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.

.4 Bottom to be 19mm veneered particle board.

.5 Provide all base cabinets with minimum 100mm high toe space of 19 mm material set back from front face of cabinets 100 mm minimum. Provide one coat of sealer to toe space. Ensure compatibility with resilient base adhesive.

.6 Doors generally to be flush overlay 19mm minimum veneered particle board with melamine fronts, backs and edges all four sides of colour to match door face. Interior face of door to be considered a finished face. Provide plastic laminate doors with contrasting colour at sink locations.

.7 Back panels minimum 6mm thick veneered particle board removable within unit where access required behind. Removable panels to have 6.4mm thick solid wood edge trim, all four sides.

.8 Refer to detail Drawings.

.9 Drawer Construction

.1 Fronts - 19mm veneered particle board with natural maple fronts and solid wood edges on all four sides. Interior face may be backing sheet.

.2 Sides and back - 13mm solid maple all glued and dovetailed together and to front. Back to be tenoned to sides.

.3 Drawer bottom to be 5mm tempered hardboard grooved into sides, back and front members.

.4 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.

.11 Sit all adjustable shelves on pilaster clips. Pilasters to be recessed into gables.

2.5 **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 maple veneer plywood 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.

2.6 **CONTROL PANELS**

.1 Provide control panels where indicated on drawings.

.2 Face shall be 19mm particleboard with plastic laminate finish. Plastic laminate finish shall generally match plastic laminate countertops in each room, as applicable. Provide cutouts for mechanical and electrical equipment, as detailed. Coordinate with mechanical and electrical subtrades for installation of devices.

.3 Trim at control panels shall be solid maple, as detailed, with clear finish to match casework.

2.7 **TALL CUPBOARDS**

.1 Construct tall cupboards generally similar to base cabinets.

.2 Provide minimum 100mm high toe space of 19 mm material set back from front face of cupboard and in line with adjacent base cabinets. Provide one coat of sealer to toe space. Ensure compatibility with resilient base adhesive.

.3 Doors shall be 38mm solid wood core, plastic laminate veneered, flush slab doors, as specified above.

.4 Locksets, which are to be keyed alike to classroom doors, are supplied under the door hardware but are to be installed under this section.

2.8 **COUNTERTOPS**

.1 Provide and install counter tops of types noted on drawings and herein specified. Refer to Section 06 41 19 for plastic laminate countertops.

2.9 **FURNITURE FINISHING (WOOD BENCHES)**

.1 Carefully prepare all work to receive finish. Thoroughly sand all wood surfaces to remove machine marks and make dust-free before finishing.

.2 Finish all surfaces with one coat of sealer, sanded smooth, and two coats of finish as specified. Apply finish in accordance with best practice and the resultant finish must be of highest quality for furniture use.

.3 Finish unexposed surfaces with two coats of tinted sealer including backs of all base and wall cabinets, enclosures, etc.

.4 Before proceeding submit prepared 300mm x 300mm finished samples of materials for approval.

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 and counter tops.

.4 Use draw bolts in countertop joints.

.5 At junction of countertop, 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.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 Provide all countertops as indicated on drawings.

.2 Provide control panel faces.

.3 Provide plastic laminate frame, sill, jamb, and head at windows in Classroom 114-1, 114-2, 114-3.

.4 Linear grille in PLAM counter top and base for new bookcase with concealed radiator in ex. Kindergarten 121. Refer to Section 06 41 13.

.5 Provide plastic laminate sill in ex. Kindergarten Room 121.

1.2 RELATED WORK

.1	Concrete Unit Masonry	Section 04 22 00
.2	Rough Carpentry	Section 06 10 00
.3	Finish Carpentry	Section 06 20 00
.4	Casework	Section 06 41 13
.5	Door Hardware	Section 08 71 00
.6	Plumbing Fixtures	Division 22
.7	Electrical	Division 26

1.3 SUBMITTALS

.1 Refer to Section 01 33 23.

.2 Samples:
- .1 Submit two 300 x 300mm samples of each type and colour of laminate to the Consultant for approval.
- .2 Submit sample of typical panel showing colour and details of edging, forming and construction.
- .3 All samples shall be identified by the project number, date and the name of the contractor.
- .4 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, mechanical and electrical fittings, and other items to be installed in countertops and panelling.

.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.

1.4 **PROTECTION**

.1 Refer to General Instructions Section 01 10 00.

.2 Handle and store countertops in accordance with manufacturers recommendations.

.3 Countertop surfaces shall be covered with heavy kraft paper, or tops shall be put in cartons for protection during shipment.

.4 If protective film is provided, do not remove until counters have been installed.

.5 Remove any stickers immediately after installation

.6 Protect installed countertop surfaces with heavy kraft paper secured in position with masking tape. Do not remove until final inspection.

.7 Comply with the printed directions, issued by the material manufacturers.

1.5 **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**

.1 Plastic laminate:

.1 Arborite, Formica, or Wilsonart, conforming to CAN3-A172.

.2 1.6mm (.062") thick, general purpose grade for flatwork and 1.25mm (.050") thick standard postforming grade for shaped profiles and bends; finishes to be suede finish, solid, patterned and wood grain colours as later selected by the Consultant from the manufacturers standard range of colours. Balancing sheet shall be the same thickness as surface sheet and shall be supplied by the same manufacturer.

.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, or equal by Panolam Industries, Tafisa Canada, or Flakeboard, 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 Children & Schools certified low emitting products.

.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.

.4 Sealer: 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.

.6 Fixing clips: 1.6mm. (16 ga.) steel, galvanized (or prime painted), as detailed.

.7 Linear grille: Refer to Section 06 41 13.

2.2 **PLASTIC LAMINATE COUNTERTOPS**

.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 of equal weight 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 2440 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.

.9 Linear Grilles:
- .1 Provide framing for attachment of continuous linear grilles to be installed in countertops where radiant heating units are located below counters, and where indicated on drawings.
- .2 Coordinate grille locations with locations of linear grilles to be installed at cabinet base.

2.3 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 Seal edges at all cut-outs in countertops. Provide edging, matching face finish, where cut edges will remain exposed.

.3 Provide matching edging at all cut-outs in panelling.

2.4 EXAMINATION OF SURFACES AND CONDITIONS

.1 Refer to General Instructions 01 10 00.

.2 Surface and ambient temperatures shall be minimum of 20°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 or panelling, 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 Upon completion of installation remove identification marks and clean surfaces. Protect as specified above.

.6 At junction of counter back splash and adjacent wall finishes, apply small bead of sealant. Walls shall be cleaned of chalk lines, dirt, grease, etc., before sealant is applied.

.7 **Install continuous grilles in countertops above radiant heating units, and where indicated on drawings.**

3.2 TRIM

.1 Decorative laminate trim shall be as detailed. Joins shall be kept to the minimum, with none occuring in lengths under 3000mm. Slightly bevel the laminate edges of joints. Secure trim with adhesive.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Thermal insulation in walls.
.2 Acoustic insulation.
.3 Includes all insulation indicated on drawings but not specified elsewhere.

1.2 RELATED WORK

.1	Concrete Unit Masonry	Section 04 22 00
.2	Lateral supports	Section 05 52 00
.3	Rough Carpentry	Section 06 10 00
.4	Perimeter Insulation	Section 07 21 13
.5	Vapour Barriers	Section 07 26 00
.6	Under-Slab Vapour Barrier	Section 07 26 16
.7	Steel Siding	Section 07 46 19
.8	Roof insulation	Section 07 51 00
.9	Firestopping	Section 07 84 00
.10	Gypsum Board	Section 09 29 00

1.3 REQUIREMENTS OF REGULATING AGENCIES

.1 Where combustible insulation or vapour barrier materials are specified herein, comply with applicable code requirements including supply and installation of approved non-combustible backing and independently supported, non-combustible insulation covering, except where noted specifically as Work of other Sections.

1.4 REFERENCES

.1 ULC
- .1 CAN/ULC S702 Standard for Mineral Fibre Thermal Insulation for Buildings
- .2 CAN/ULC-S701 Thermal Insulation, Polystyrene, Boards and Pipe Covering
- .3 CAN/ULC-S704 Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced

.2 ASTM International
- .1 ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation
- .2 ASTM C303 Standard Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation
- .3 ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- .4 ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- .5 ASTM C665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- .6 ASTM E413 Classification for Rating Sound Insulation

1.5 **DELIVERY AND STORAGE**

.1 Store packaged materials in their original wrappings or containers with manufacturer's labels and seals intact. Store flammable materials outside the building and protect from all weather hazards and open flame. Abide by all fire protection regulations imposed by the authorities having jurisdiction, and take precautionary measures to avoid fire.

.2 Do not store insulation in direct contact with the earth, road surface or floors. Place suitable forms or skids under the insulation upon delivery to protect the insulation from absorbing dampness from the surrounding terrain or floor. Cover material with approved tarpaulins and secure.

.3 In cold weather, provide warm storage for adhesives such that their consistency is suitable for ease of application

1.6 **PROTECTION**

.1 Protect surfaces, and in particular the building cladding finish, from being marred or contaminated by the materials.

PART 2 - MATERIALS

2.1 **MATERIALS**

.1 Air Barriers and Vapour Retarders
- .1 Vapour retarders in exterior walls shall be as specified in Section 07 26 00.
- .2 Vapour Barrier at slab-on-grade is specified in Section 07 26 16.
- .3 Air barriers in exterior walls shall be as specified in Section 07 27 00.

.2 Cavity Wall Insulation:
- .1 Stone mineral wool fibre insulation board, semi-rigid, conforming to CAN/ULC S702, RSI value of 0.76m^2K/W per 25.4mm (R-4.3/inch), with a flame spread rating of 0, smoke developed rating of 0, manufactured and sized to suit metric masonry coursing;
- .2 Insulation shall be 100/65 kg/m^3 dual density CavityRock by Rockwool International, Thermafiber Rainbarrier 45 by Owens Corning, or 72 kg/m^3 (4.5 pcf) density Cladstone by Johns Manville.
- .3 Insulation in cavity wall to be minimum 114mm thick, min. R-value of R-19.35.
- .4 Insulation at metal siding and concrete block wall assembly at Upper General Purpose Room to be minimum 152mm thick, min. R-value of R-25.8.
- .5 Provide wind blocks of higher density mineral wool, as specified below.

.3 Batt insulation:
- .1 Insulation in metal framing at exterior walls to be 152mm thick, min. R-value of R-22.5.
- .2 Rockwool International “Comfort Batt”, Johns Manville “TempControl”, or Owens Corning “Thermafiber UltraBatt”, friction fit stone wool batts.
- .3 Provide thicknesses sized to match the depth of the steel studs, as indicated on drawings.

.4 Wind Blocks in Cavity Walls:
- .1 Stone mineral wool fibre insulation, rigid board with minimum density of 176 kgs/m³ (11 lbs/ft2); ComfortBoard 110 by Rockwool International.
- .2 50mm thickness, cut in strips 100mm wide.

.5 Polystyrene Board Insulation(walls):
- .1 In wall and curb assemblies where indicated on drawings. See section 07 21 13, Perimeter Insulation, for polystyrene insulation products installed at, and below, grade
- .2 Closed-cell, cellular, foamed, smooth skin, extruded polystyrene foam insulation to meet specified requirements of CAN/ULC-S701, type 2 or 3; 75mm thickness, LTTR of minimum R-15.
- .3 Styrofoam Cavitymate SC by Dow Chemical Canada Ltd. or Foamular C-200 by Owens Corning, with shiplap edge.

.6 Insulation fasteners: "Wedge-Lok" by Block-Lok or Thermafiber RainBarrier Clip by Owens Corning.

.7 Sound Attenuation Insulation:
- .1 Mineral wool insulation to thickness shown on drawings, and as required to obtain required S.T.C. rating; AFB acoustic fire batt by Rockwool International, MinWool SAFB by Johns Manville, or Thermafiber SAFB Sound Attenuation Fire Blankets (unfaced) from Owens Corning.

.8 Fibrous Board Insulation: Comply with CGSB 51-GP-11, Thermal Insulation, Mineral Fiber, Blanket, for Piping, Ducting, Machinery and Boilers

.9 Compressible Filler: Emseal "Backerseal"

.10 Adhesives:
- .1 Type recommended by insulation manufacturer for the specific application.
- .2 To have adequate early and permanent bond and tensile strength for application, and have a service temperature between high and low temperatures to which they will be subjected.
- .3 LePage PL 300 Foamboard Adhesive, or equivalent, for polystyrene board insulation, subject to insulation manufacturer's approval.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Ensure that surfaces to receive adhesive or insulation are dry, firm, straight, slightly textured for bond, and free from loose material, projections, ice, frost. slick, grease, oil or other matter detrimental to bond of the adhesive or uniform bedding of the insulation.

.2 Maintain surface and ambient temperatures constantly between 38°C and 10°C during application and curing of adhesive except as permitted otherwise by the Consultant in writing.

.3 Report surfaces left unacceptable by other trades to the Consultant.

3.2 **INSTALLATION - GENERAL**

.1 Install insulation to thicknesses shown on the Drawings.

.2 Install all materials in accordance with manufacturer's printed instructions unless otherwise specified herein.

.3 In construction separating interior from exterior, locate vapour barrier on the warm-in-winter side of the insulation.

.4 Ensure a uniform, continuous thermal and vapour barrier effect. Where insulation and vapour barriers are to be provided under other Sections, co-ordinate the work such that thermal and vapour barrier continuity is achieved.

.5 Where hangers for suspended ceilings and where supports for heating units pass through insulation and vapour barrier construction, butter apertures liberally with vapour barrier adhesive and ensure continuity of thermal and vapour barrier provisions.

.6 Apply adhesives to the entire surface of the substrate using notched trowels of the type recommended by the adhesive manufacturer.

.7 Pack all crevices and voids, with friction fit batt insulation.

3.3 **CAVITY WALL INSULATION**

.1 Inspect air/vapour retarder membrane before covering with insulation. Do not proceed unless air/vapour retarder work is complete, including repairs as specified in Section 07 26 00.

.2 Apply cavity wall insulation to thickness as shown on Drawings to the outer face of the interior masonry or drywall wythe. Insulation shall fit tightly between spacing wall ties. All butt joints shall be brought into moderately tight contact. Any cutting or fabricating shall be made of the largest module possible of insulation, to reduce the number of joints.

.3 After installation of insulation ensure all ties are provided with wedges to hold insulation tight to air/vapour membrane prior to installation of exterior wythe.

.4 Wind Blocks:
- .1 After application of cavity wall insulation and exterior insulation, adhere continuous strips of specified board insulation vertically in corners of walls between insulation and exterior masonry to form wind blocks.
- .2 Thickness of insulation strip is to be thicker than air space, so that insulation layers will be compressed when masonry is installed.
- .3 Provide additional air blocks at intermediate locations in walls exposed to prevailing winter winds, where uninterrupted expanse of wall exceeds 10m.

3.4 ACOUSTIC INSULATION AT NON-BEARING WALLS

.1 Masonry Partitions:

.1 Insert sound attenuation fire batt (SAFB) insulation between tops of non-bearing, non-rated masonry walls and structure above.

.2 Coordinate with forces installing lateral support angles to ensure insulation is installed at tops of walls before lateral support angles have been installed both sides.

.3 Insert SAFB batt insulation around OWSJ or structural steel where they occur directly over non-bearing masonry walls. Provide gypsum board enclosure to form acoustic barrier; refer to Section 09 29 00.

.2 Provide SAFB insulation in all steel framed partitions separating rooms, at framed enclosures above masonry partitions or above openings in masonry partitions, in bulkheads where required to maintain acoustic separation, and where acoustic insulation is indicated on drawings.

.3 Firestopping between tops of fire rated walls and structure above, is specified in Section 07 84 00.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Supply and installation of 75mm thick rigid insulation minimum 1200mm vertically at exterior side of foundation walls.

.2 Supply and installation of 75mm thick rigid insulation minimum 1200mm horizontally below slab-on-grade at exterior walls, and continuous 50mm thick rigid insulation horizontally below frost slabs.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Cast-In-Place Concrete	Section 03 30 00
.2	Thermal Insulation	Section 07 21 00
.3	Roof Insulation	Section 07 51 00
.4	Grading	Section 31 22 00
.5	Excavation and Fill	Section 31 23 00

1.3 REFERENCES

.1	CAN/ULC-S701	Thermal Insulation, Polystyrene, Boards and Pipe Covering
.2	CGSB-71-GP-24M	Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation

1.4 SUBMITTALS

.1 In lieu of samples and inspection procedures when required by CGSB Specifications, submit affidavits, if requested, that materials supplied under these requirements meet CGSB Specifications.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Store insulation materials in dry areas, protected from wetting, sunlight and traffic. Store insulation board flat, on a flat surface, and to prevent edge damage and placing of materials on top of stored boards.

.2 Ensure that insulation board and adhesives are stored at a minimum temperature of 4 deg. C. for 12 hours before installation, and that freezable adhesives are stored only at temperatures above 0 deg. C. at all times.

1.6 JOB CONDITIONS

.1 Do not expose insulation board to sunlight after installation. Protect it with polyethylene or tarpaulin cover as recommended by manufacturer if backfilling is not completed within 24 hours; and, as soon as practicable, backfill and pour concrete slab.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Closed-cell, cellular, foamed, smooth skin, extruded polystyrene to meet specified requirements of CAN/ULC-S701-05, type 4.
- .1 Styrofoam SM by Dow Chemical Canada Ltd. or Foamular C-300 by Owens Corning.
- .2 Provide 75mm boards, RSI 2.64 (R-15), for vertical applications.
- .3 Provide minimum 75mm boards, RSI 2.64 (R-15) for horizontal applications.

.2 Adhesives:
- .1 Conform to CAN/CGSB-71-GP-24M, Type 1, trowel consistency, synthetic rubber based insulation adhesive, solvent type, smooth spreading adhesive.
- .2 Adhesive shall be approved by board manufacturer for the specific application.
- .3 Adhesive shall have adequate early and permanent bond and tensile strength for application, and have a service temperature between high and low temperatures to which they will be subjected.
- .4 LePage PL 300 Foamboard Adhesive, or equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Before commencing Work, ensure that all surfaces to which insulation board is applied are clean, reasonably smooth, with no abrupt changes in plane, free of grease and with protruding fins of mortar or concrete removed, and that the surfaces are otherwise acceptable for insulation application as specified.

3.2 INSTALLATION

.1 Install insulation board in accordance with manufacturer's specifications.

.2 Vertical insulation:

- .1 Adhere 75mm thick insulation boards to exterior of foundations walls, extending from top of foundation down minimum 1200mm.

.3 Install boards in largest panel sizes possible in order to cover areas by full length panels and to minimize cutting and number of joints.

.4 Butt boards in moderate contact.

.5 Secure insulation by adhesive.

.6 Prime surfaces before application of adhesive only where and as recommended by adhesive manufacturer.

.7 Apply 50mm diameter pads of adhesive to faces of panels as required to hold board in place on walls.

.8 Position and press boards into full contact with adhesive, and temporarily hold them in place until adhesive has set.

.9 Ensure that backfilling is completed within 24 hours, and that it does not dislodge or damage insulation.

.10 Horizontal Insulation Under Slab-on-grade:

.1 After installation of stone base below slab, and prior to installation of under slab vapour barrier, place minimum 75mm thick insulation boards horizontally, with top surface at level of underside of floor slab, adjacent to exterior walls at full perimeter of building.

.2 Insulation shall extend horizontally minimum 1200mm from interior face of foundation wall.

.3 This is in addition to vertical perimeter insulation specified above.

.11 Place minimum 50mm thick horizontal insulation below entire area of exterior concrete frost slabs at entrances, over granular base.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Create a full air and vapour barrier to exterior face of interior wythe of masonry where cavity wall noted, at soffits, and elsewhere as indicated on drawings or otherwise required to maintain continuity of air barrier/vapour retarder. Note that vapour retarders may also be referred to as vapour barriers in these contract documents.

.2 Sealing of windows, doors and other locations as indicated on drawings, by membrane air barrier.

.3 Cleaning and priming of substrate, installation of vapour retarder and coordination of insulation attachment. Co-ordinate with other Sections to provide a complete air barrier/vapour retarder system where in contact with components specified elsewhere.

.4 Coordinate with forces installing vapour barriers below interior slabs-on-grade and at roof. Coordinate with Air Barrier installation at steel framed exterior walls. Air/Vapour Barrier system is required to be continuous for the entire building.

1.2 RELATED WORK

.1	Concrete	Section 03 30 00
.2	Clay Unit Masonry	Section 04 21 00
.3	Concrete Unit Masonry	Section 04 22 00
.4	Thermal Insulation	Section 07 21 00
.5	Under-Slab Vapour Barrier	Section 07 26 16
.6	Air Barrier	Section 07 27 00
.7	BUR Roofing	Section 07 51 00
.8	Modified Bituminous Roofing	Section 07 52 00
.9	Joint Sealants	Section 07 92 00
.10	Hollow Metal Doors and Frames	Section 08 11 13
.11	Aluminum Windows	Section 08 51 13

1.3 INSPECTION

.1 Manufacturer of the membrane material shall inspect surfaces to which material is to be applied, to ensure that the surfaces are suitable, provide periodic inspection during the application of the membranes, and inspect completed work immediately prior to covering with other materials to ensure that membranes are in an undamaged condition and installed to provide an air/vapour barrier system.

1.4 DELIVERY AND STORAGE

.1 Deliver and store materials, undamaged in original wrappings, in a suitable environment.

1.5 SPECIAL PROTECTION

.1 Provide adequate protection of materials and work of this Section from damage by weather and other causes.

.2 Protect the work of other Subcontractors from damage resulting from work of this Section. Make good such damage to the satisfaction of the Consultant.

1.6 **SITE CONDITIONS**

.1 Maintain surfaces and ambient air temperature 5 deg C minimum, for a minimum period of 72 hours prior to, during, and after waterproofing application.

1.7 **QUALITY CONTROL**

.1 The membrane manufacturer's factory-trained agent shall be on site at the beginning of the installation to provide training and supervision of the Contractor's personnel in the installation of the membrane. He shall also provide frequent inspection visits thereafter to assure the quality and competence of the membrane installation.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Vapour Retarder at Cavity Walls

.1 Materials shall be as manufactured by Grace Construction Products, Henry Company, Tremco, W.R. Meadows, IKO, or Soprema. All materials used are to be by same manufacturer.

.2 Vapour retarder membrane:

.1 Perm-A-Barrier by Grace, Blueskin SA by Henry Co., ExoAir 110 by Tremco, Air Shield by W.R. Meadows, AquaBarrier AVB by IKO, or Sopraseal Stick 1100T by Soprema Canada

.2 When ambient or surface temperatures are below 5°C, use low temperature versions of these products.

.3 Primer:

.1 Perm-A-Barrier WB Primer by Grace, Blueskin Primer by Henry, ExoAir 10 Primer by Tremco, Mel-Prime by W. R. Meadows, S.A.M. Adhesive by IKO, or Elastocol Stick by Soprema.

.2 For low temperature applications use low temperature primers as recommended by the membrane manufacturer; Mel-Prime Solvent Base Primer by W.R. Meadows, or equivalent.

.3 For applications over green concrete or damp substrate, use primers recommended by the membrane manufacturer for this purpose; Bituthene Primer B2 by Grace or equivalent.

.4 Mastic: for sealing joints and edges of membrane use Bituthene Mastic Trowel Grade Grace, Air-Bloc 21 by Henry, ExoAir Termination Mastic by Tremco, Pointing Mastic by W.R. Meadows, AquaBarrier Mastic by IKO, or Sopramastic by Soprema.

.5 Liquid membrane:
.1 Bituthene Liquid Membrane by Grace Construction Products, Air-Bloc 21 by Henry, ExoAir 120 by Tremco, Air Shield LM by W.R. Meadows, AquaBarrier Mastic by IKO, or Sopraseal LM 200 by Soprema.
.2 Use for all protrusions or any difficult detail areas which do not allow for easy installation of the membrane.
.3 Can be placed over or under membrane with at least 64 mm overlap.

.2 Through-wall flashing: Perm-A-Barrier Wall Flashing by Grace, Blueskin TWF by Henry Co., ExoAir TWF by Tremco, Air Shield TWF by W.R. Meadows, AquaBarrier TWF by IKO, or Sopraseal WFM by Soprema.

.3 Vapour Barrier at Slab-on-Grade
.1 Vapour barrier under slabs-on-grade: 15 mil polyolefin membrane, as specified in Section 07 26 16.

.4 Polyethylene Sheet:
.1 10 mil polyethylene sheet, conforming to CAN/CGSB-51.34
.2 For use only where polyethylene vapour barrier is indicated on drawings, where specified self adhering vapour retarder is unsuitable.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

.1 Examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

.2 Ensure concrete surfaces are clean, dry, smooth and free of fines, voids, honeycomb, spalled areas, sharp protrusions, etc.

.3 Surfaces shall be free from loose particles, grease, oil, wax and other foreign matter.

.4 Exposed metal surfaces shall be made clean of paint, oil, rust, or other contaminants, wiped clean with coal-tar solvent, and primed with primer.

.5 Fill voids, holes and cracks, especially in mortar joints, with lean mortar mix, non-shrinking grout, or parge coat, to ensure continuity of flat surface.

.6 All concrete surfaces shall be surface dry and have negative alkalinity when surface tested.

.7 Protect adjacent surfaces not designated to received vapour retarder.

3.2 APPLICATION / WORKMANSHIP

.1 Ambient, surface and material temperature shall be minimum 5°C for standard products, or minimum -4°C for low temperature products. Confirm temperature requirements with the manufacturer.

.2 Apply primer as recommended by manufacturer depending on porosity of surface. Prime only the area to be covered in a working day.

.3 Allow primer to dry to a tacky surface, approximately 30 minutes, depending on environmental conditions.

.4 Reapply primer if time lapsed between first application and installation of membrane exceeds 24 hours.

.5 Apply sheet membrane so that laps shed water, i.e. start from low point.

.6 Apply membrane in continuous strips, to as long length as possible to minimize joints. Apply membrane at edge of existing air barrier and openings in minimum 200mm strips, overhanging opening 100mm to allow junction with door or window frame and with air barrier.

.7 Roll lap seam with an extension handled countertop roller. Roll across the seam first, then with the seam to eliminate any "fishmouths".

.8 Lap all ends 75mm minimum. Seal all seams with mastic, applied in accordance with manufacturer's written instructions.

.9 Construction and control joints: double ply covered with initial strip of 150mm width and second strip of 457mm width, after application of dampproofing.

.10 Cutoff at end of day operations shall be sealed with mastic.

.11 Seal holes around pipes, vents and other services passing through membrane by using mastic applied in accordance with manufacturer's directions. Liberally coat areas with mastic for radius of 150mm around drain hub, piping, vents, etc. before and after application of membrane.

.12 Refer to manufacturer's written instructions and details for required procedures of installation.

.13 Lap membrane onto frames at windows, doors and the like to ensure continuity of the air/vapour barrier seal. If membrane is installed in advance of windows or door frames, extend membrane, leaving backing intact, to allow for lapping onto frames at a later time. Protect membrane left unattached in this manner.

.14 At all locations where membrane will be covered with insulation, temporarily protect membrane from puncture or install membrane immediately prior to application of insulation.

.15 At all detailed areas, take extra care to ensure continuity of the air/vapour barrier.

.16 All inside and outside corners shall be double covered with initial strip of membrane 305mm wide, centred.

.17 Inspect membrane before covering and repair as necessary. Cover tears and inadequate overlaps with membrane. Seal edges of patches with pointing mastic.

3.3 **PROTECTION AND CLEANING**

.1 Remove any masking materials after installation. Clean any stains on materials that would be exposed in the completed work using procedures recommended by manufacturer.

.2 Install insulation as soon as possible after installation of air/vapour barrier. Insulation to be tight to vapour barrier, anchored in place with plastic wedges to insure rigid location of insulation; refer to Section 07 21 00.

.3 If the vapour barrier membrane system cannot be covered within 30 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Provide a membrane vapour barrier below interior slabs-on-grade.

1.2 RELATED WORK

.1	Concrete	Section 03 30 00
.2	Sheet Waterproofing	Section 07 13 00
.3	Perimeter Insulation	Section 07 21 13
.4	Vapour barrier at cavity wall	Section 07 26 00
.5	Vapour barrier at roof	Section 07 51 00
.6	Excavation and Fill	Section 31 23 00

1.3 REFERENCE STANDARDS

.1 ASTM International:

.1	ASTM E1643	Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
.2	ASTM E1745	Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
.3	ASTM E96	Standard Test Methods for Water Vapor Transmission of Materials.
.4	ASTM E154	Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slab
.5	ASTM D1709	Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
.6	ASTM C920	Standard Specification for Elastomeric Joint Sealants

1.4 QUALITY CONTROL

.1 Arrange and pay for a site visit by a technical representative of the manufacturer of the vapour barrier membrane at the commencement of the under-slab vapour barrier installation. Review with manufacturer all recommended procedures and techniques for installing vapour barrier and accessories. Review methods of sealing penetrations and sealing of vapour barrier to walls.

1.5 DELIVERY AND STORAGE

.1 Deliver and store materials, undamaged in original wrappings, in a clean, dry environment.

.2 Provide adequate protection of materials and work of this Section from damage or contamination by weather and other causes.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Vapour barrier:
- .1 Permeance shall be less than 0.01 perms, tested after conditioning (ASTM E1745, paragraphs 7.1.2 - 7.1.5)
- .2 Strength Class A (ASTM E1745)
- .3 Minimum thickness 0.38mm (15 mil)
- .4 15 mil polyolefin sheet vapour barrier; "Stego Wrap" by Stego Industries LLC. or "Perminator 15mil" by W.R. Meadows Inc.

.2 Accessories:
- .1 Seam Tape: as recommended and provided by vapour barrier manufacturer; Stego Tape or Perminator Tape
- .2 Vapour-proofing Mastic: Stego Mastic, or as recommended and provided by vapour barrier manufacturer
- .3 Construction Adhesive:
  - .1 One part moisture curing polyurethane non-sag sealant
  - .2 to CAN/CGSB-19.13; ASTM C 920-11, Type S, Grade NS, Class 35
  - .3 Dymonic FC by Tremco Ltd., or Pourthane NS by W.R. Meadows.

PART 3 - EXECUTION

3.1 GENERAL

.1 Do not proceed until stone base below slab-on-grade has been placed and compacted and horizontal perimeter insulation has been installed.

.2 Examine surfaces to receive membrane. Notify Consultant if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

.3 Prepare surfaces in accordance with manufacturers instructions. Level and tamp or roll aggregate immediately prior to commencing installation of vapour barrier.

.4 Ensure adjacent surfaces are clean, dry, smooth and free of fines, voids, honeycomb, and free of sharp edges and protrusions.

.5 All concrete surfaces shall be surface dry and have negative alkalinity when surface tested.

.6 Tie in underslab vapour barrier with vertical waterproofing membranes for a continuous waterproofing system.

3.2 VAPOUR BARRIER BELOW SLABS-ON-GRADE

.1 Provide membrane vapour barrier under all slabs-on-grade.

.2 Install the vapour retarder membrane in accordance with manufacturer's instructions and ASTM E1643.

.3 Place vapour barrier over granular base for slabs-on-grade, prior to placement of concrete floor slabs-on-grade.

.4 Unroll vapour barrier with the longest dimension parallel with the direction of the pour.

.5 Install using taped lap method, lapping joints 150mm, and taping and sealing all seams with manufacturer's tape. Lap all edges of vapour barrier minimum 150mm and place upper layer of lap so that the direction of concrete placing will be from upper layer to lower layer.

.6 Lap vapour barrier over footings and seal to foundation walls.

.7 Turn vapour barrier up walls minimum 200mm at edges of slab, sealing to walls (below finished floor level) with construction adhesive.

.8 Construct pipe collars from vapour retarder material and pressure sensitive tape per manufacturer's instructions.

.9 Seal all penetrations, including pipes, with mastic in accordance with manufacturer's instructions. Avoid penetrations as much as possible; do not use screed pins.

.10 Repair any tears or holes (including pin holes) immediately, before concrete is placed. Repair damaged areas with patches of vapour barrier material, overlapping damaged area 150mm and taping all sides.

.11 Trim vapour barrier after concrete has cured.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Vapour Barriers	Section 07 26 00
.2	Joint Sealants	Section 07 92 00
.3	Hollow Metal	Section 08 11 13
.4	Aluminum Windows	Section 08 51 13

1.2 STANDARDS

.1 Refer to Ontario Building Code (Reg 332/12, as amended).

.2 CAN/ULC-S710.1 Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 1: Material Specification; Class I

.3 CAN/ULC-S710.2 Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 2: Application

.4 ASTM E84 Standard Test Method for Surface Burning Characteristics for Building Materials

.5 ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops

1.3 SUBMITTALS

.1 Submit samples to 01 33 23.

.2 Submit manufacturer's affidavits that the products meet or exceed specified requirements and listed standards. Submit in accordance with Section 01 33 23.

.3 Submit manufacturer/s project data for materials, providing descriptions suitable for identification of products on site. Include manufacturer's printed installation instructions.

1.4 STORAGE AND HANDLING

.1 Deliver and store materials in the original packaging, with manufacturer's seals and labels intact. Store and protect from damage in accordance with manufacturer's recommended procedures.

.2 Keep containers tightly closed when not in use.

.3 Keep Products away from direct sunlight.

.4 Do not incinerate aerosol canisters.

1.5 WARRANTY

.1 Provide extended warranty to **two (2) years** from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Insulating Foam Sealants:

.1 General Purpose:

.1 Semi-rigid single-component polyurethane foamed-in-place sealant to CAN/ULC-S710.1; and having the following properties:
.1 Thermal Resistance: minimum RSI 0.67/25mm (R-3.8/inch)
.2 Fire Resistance (ASTM E84): Flame spread = 15, Smoke Developed = 20.
.3 Cure Time: approximately 1 hour.
.4 Tack-free Time: 6-7 minutes.

.2 Great Stuff Pro Gaps and Cracks Insulating Foam Sealant by Dow Chemical Canada.

.2 Low Pressure Type:

.1 Semi-flexible soft, single-component polyurethane foamed-in-place sealant, to CAN/ULC-S710.1; and having the following properties:
.1 Core Density (ASTM D1622): 27.24 kg/m3
.2 Fire Resistance (ASTM E84): Flame spread = 10, Smoke Developed = 20
.3 Cure Time: approximately 12 hours
.4 Tack-free Time: 6-9 minutes

.2 Great Stuff Pro Window & Door Insulating Foam Sealant by Dow Chemical Canada

.2 Flexible Foam Sealant:

.1 One-component, minimal-expanding, flexible polyurethane foam to CAN/ULC-S710.1 material specification.

.2 Class I, with maximum flame spread rating of 25 and a maximum smoke developed rating of 50.

.3 Enerfoam Professional Foam Sealant as manufactured by Dow Chemical Canada.

.3 Primer : As recommended by sealant manufacturer.

.4 Substrate Cleaner: Non-corrosive type as recommended by sealant manufacturer and approved for use by manufacturers of substrate products.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Examine joints before sealing to ensure that Configuration, surfaces, and widths are suitable for sealant and service, and that execution of sealing and performance of sealant will not be adversely affected. Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this section.

.2 Install materials in accordance with manufacturer's printed instructions, as acceptable to Authorities Having Jurisdiction, and to the Consultant/s satisfaction.

.3 Proceed with air sealant only when air, substrate and surfaces in contact with air sealant are completely dry.

.4 Apply foamed-in-place air sealant foam when ambient air temperature is greater than -3 ^{o}C and less than 44 ^{o}C.

.5 Prepare joints by brushing, scrubbing, scraping or grinding inner face surfaces to remove loose mortar, dust, oil, grease, oxidation, mill scale, and other materials which will affect adhesion and integrity of sealant, and dry with clean cloths. Ensure that surfaces have not been coated with releasing agents, coating or other treatments, or that they are entirely removed.

.6 Finished joints to be free of air pockets, imbedded foreign materials and cut back after curing to be flush with surrounding materials.

.7 Do not allow sealants to cover or spot surfaces outside of joints. Use masking tape to prevent, if necessary.

.8 Seal all joints where air leakage can occur, including at joist shoes, under base plates, between door and window frames and rough openings, around electrical and plumbing boxes, conduits and ducts that penetrate vapour barriers, around openings in roof slabs, air ducts and over top of exterior walls including wall plates at underside of slabs, and metal decks. And at any other location specified on the drawings, or in the caulking schedule, for air leakage sealing. Do not attempt to seal gaps wider than 75mm.

.9 Insulating foam sealant is not to be relied upon as a permanent air/vapour barrier, and does not replace the requirement for a fully continuous air/vapour barrier seal with the specified air/vapour barrier system components specified elsewhere.

.10 Where foam sealants are used around windows and doors, use only low pressure type.

.11 Where air leakage sealant is to be faced by other caulking materials for finishing purposes, ensure sealant is cut back or recessed to sufficient depth for finishing caulking.

.12 Foam air sealant may not be permanently exposed to ultra-violet radiation; paint or cover exposed foam.

3.2 **CLEANING AND PROTECTION**

.1 Remove from surfaces of other work sealant smears, droppings and masking tape immediately after sealant has cured to a hard surface film.

.2 Clean surfaces soiled by work of this Section. Do not use cleaning methods that will damage surrounding surfaces. Make good work cleaning has damaged under work of this Section.

.3 Upon completion of work, remove materials, equipment and debris from site. Leave installed work protected from damage for duration of construction period.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Supply and installation of preformed, prefinished steel siding panels for wall cladding, including all trim, flashing, closures, accessories, and fastening devices for the complete work as specified below and indicated on drawings.

.2 Structural design of wall cladding system, including submission of P.Eng. stamped shop drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Structural Steel	Section 05 10 00
.2	Rough Carpentry	Section 06 10 00
.3	Insulation	Section 07 21 00
.4	Flashing and Sheet Metal	Section 07 62 00

1.3 REFERENCES

.1 Canadian Sheet Steel Building Institute (CSSBI)

.1	CSSBI 20M	Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications
.2	CSSBI S8	Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products
.3	CSSBI SSF No. 6	Metallic Coated Sheet Steel Products for Structural Building Products

.2 Canadian Standards Association (CSA)

.1	CAN/CSA-S136	North American Specification for the Design of Cold-Formed Steel Structural Members
.2	CSA-S136.1	Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members

.3 ASTM International

.1	ASTM A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.2	ASTM A924M	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
.3	ASTM D2092	Standard Guide for Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting
.4	ASTM E 1592	Test Method for Structural Performance of Sheet Metal Roof and Wall Systems by Uniform Static Air Pressure Difference

1.4 QUALIFICATIONS

.1 Installation of preformed metal siding shall be by manufacturer's construction forces, or by an accredited applicator under direct control and responsibility of manufacturer, and in accordance with manufacturer's instructions.

.2 Manufacturer/installer to have minimum 5 years experience in design, fabrication and erection of wall panel systems of a similar scope of work as required under this contract. Submit proof of experience when requested by the Consultant.

.3 Perform welding to requirements of CSA W59.

1.5 **DESIGN AND PERFORMANCE**

.1 Steel cladding system shall be designed by a professional structural engineer, registered in the Province of Ontario.

.2 Steel cladding system shall be supplied by the manufacturer as a complete system. All components shall be by one manufacturer.

.3 Steel cladding shall be designed in accordance with CSSBI 20M.

.4 Design Loads:
.1 Design loading shall be in accordance with the Ontario Building Code.
.2 Design wind loads shall be based on the wind criteria expected in the geographical area in accordance with the OBC and MMAH Supplementary Standard SB-1.

.5 Design the cladding system to accommodate movement in the wall caused by structural movement or thermal expansion and contraction

.1 Base calculations on surface temperature changes of materials due to both solar heat gain and nighttime sky heat loss.

.2 Provide expansion joints aligning with building expansion joints.

.3 Provide additional expansion joints where required to accommodate movement in cladding and between cladding and building structure or adjacent materials.

.4 Deflection requirements shall be in accordance with the Ontario Building Code and, as a minimum, L/180 for wind load (but not less than 10 psf (49 kg/sq m).

.5 The completed wall cladding and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

.6 Accessories and fasteners shall be capable of resisting the specified design wind suction forces.

.6 Design wall system to maintain the following erection tolerances:
.1 Maximum variation from plane or location to be 20 mm/10 m.
.2 Maximum offset from true alignment between two adjacent members abutting end to end in line to be 1 mm.

1.6 **SUBMITTALS**

.1 Submit shop drawings and erection drawings of preformed metal siding incorporating design conditions.

.2 Shop drawings shall clearly show and describe in detail, materials, thermal spacers, fastening devices, fastener spacing, flashings, trim, caulking, finishes, rough wood carpentry and forming, erection details, and relationship to adjoining Work.

.3 Provide elevation drawings indicating panel sizes. Detail connections between panels. Joins shall occur over framing members, and shall be located in a regular pattern.

.4 Coordinate with manufacturer of thermal spacer clips for engineering factors required in design of framing for metal siding.

.5 Wherever practicable, take field dimensions and check against Drawings. Do no fabrication until in receipt of reviewed Drawings.

.6 Provide framing design drawings for metal screens. All framing members shall be galvanized steel.

.7 Shop drawings shall be stamped by a professional Engineer, registered in the Province of Ontario, who shall be responsible for the framing of siding using system of thermal spacers and z-girts or hat channels.

.8 Provide printed instructions for cleaning and maintenance of panel finishes for incorporation into maintenance manuals specified in Section 01 78 00.

1.7 **SAMPLES**

.1 Submit one (1) sample of panel in colour selected for approval prior to delivery on Site.

1.8 **PRODUCT HANDLING**

.1 Unload and handle siding panels using methods recommended by manufacturer, and of not pile higher than one unit strapped load.

.2 Retain metal strapping until immediately before erection of panels.

.3 Store clear of ground on wooden stringers of full sheet width, spaced 750mm maximum.

.4 Keep stock piled panels dry with plastic tied-down covers.

1.9 **WARRANTY**

.1 Submit a warranty as specified under General Conditions of the Contract stating that the preformed metal siding will remain free from all failures for an extended period of **five (5) years**.

.2 Provide a manufacturer's written warranty covering failure of factory-applied exterior finish for a minimum period of **twenty (25) years** against chalking and fading and for **thirty (30) years** for film integrity.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Metal Siding System

.1 Panels fabricated from unpassivated galvanized coil coated steel sheet in accordance with requirements of ASTM A653M, grade 230, with zinc coating designation of Z275 (galvanized), and having a nominal core steel thickness of 0.76mm (22 ga).

.2 Prefinished metal siding panels to be as follows:

.1 Corrugated Sheet 7/8" by VicWest or Corrugated 7/8" by Agway Metals Inc.

.2 Prefinished metal siding is to be installed horizontally generally, with some areas installed vertically. Locations to be as indicated on drawings.

.2 Coatings

.1 Panels and all trim pieces shall have prepainted polyurethane finish by Arcelor Mittal Dofasco Inc.

.1 Colour QC 7500, “Silver”.

.3 Fasteners:

.1 Concealed: No. 12 teks self-drilling, self-tapping galvanized screws.

.2 Exposed: stainless steel with coloured nylon head to match substrate colour

.4 Accessories

.1 Flashing: In accordance with Section 07 62 00. Material to match cladding in exposed locations, galvanized material in concealed locations. Custom fabricated to suit architectural details. Use preformed corner pieces only. Double back exposed edges.

.2 Closures: Metal closures to suit profiles selected, to manufacturer's recommendations.

.3 Sealants:

.1 Exposed: 1 component silicone sealant in accordance with CAN/CGSB 19.13.

.2 Concealed: Non-skinning, non-drying, butyl rubber compound.

.3 Select colour to match adjacent panels at exposed bead locations.

.5 Field Touch-Up Paint: Zinc rich anti-corrosion primer, ZRC by ZRC Worldwide, and compatible top coating of type and colour to match finish sheet.

.6 Insulation:

.1 Mineral wool insulation as specified in Section 07 21 00.

.2 Minimum 152mm cavity wall insulation at steel siding on concrete block walls. Minimum 102mm continuous insulation over exterior sheathing at metal framed walls.

.3 Insulation shall fully enclose thermal break spacers; provide increased thicknesses of insulation where required to cover any thermal break spacers larger than the specified insulation thicknesses.

.7 Vapour Barrier: as specified in Section 07 26 00.

.8 Thermal Break Spacers:

.1 Cascadia Clips, by Cascadia Windows and Doors.
.1 Screws to be Master Gripper screws, with DT 2000 coating, by Leland Industries, supplied by Cascadia.

.2 iCLAD Thermally Isolating Substructure System by Spring Valley; with screws provided by the system manufacturer.

.3 Depth of thermal spacers shall match depth of insulation; fibreglass, in particular, must be covered by the mineral wool insulation. Screws must be sized to penetrate substrate by at least 50mm.

.9 Z-girts and Hat Channels:
.1 Minimum 1.21mm (18 ga.)thick formed galvanized steel, ASTM A653M Grade 230 with Z275 zinc coating; depths as required for the specific installation as indicated on drawings and confirmed by site measurement.
.2 Typically, use z-girts for vertical framing, for horizontal siding application, and use hat channels for horizontal framing for vertical installation of siding.

2.2 **FABRICATION**

.1 Fabricate components to comply with dimensions, profiles, gauges and details as shown on the reviewed shop drawings, including all related flashing.

.2 Fabricate all components of the cladding system in the factory, ready for field installation.

.3 Provide cladding and all accessories in longest practicable lengths to minimize field lapping of joints.

PART 3 - EXECUTION

3.1 **INSTALLATION**

.1 Erect z-girts/hat channels and thermal spacer clips in accordance with the instructions of the manufacturer of the thermal spacer clips, and the engineer's framing design on the reviewed shop drawings.

.1 Thermal clips to be fastened to structural masonry wall at 600mm on centre vertically and 400mm on centre horizontally, unless otherwise required by the engineer responsible for the framing design.

.2 Coordinate with forces installing mineral wool insulation. Insulation depth to be sufficient to cover sides of fibreglass thermal spacer clips completely.

.3 Erect preformed metal siding and accessories in strict accordance with reviewed shop and erection drawings and manufacturer's instructions.

.4 Co-operate with other trades as required to ensure proper installation and anchorage of this Work.

.5 Damaged, bent or dished sheets will be rejected.

.6 Place metal siding against supporting framing and adjust to final position before permanently securing. Bring each unit to bear evenly on framing.

.7 Align units to provide accurate fit with corresponding sections parallel and straight. Ensure complete nesting of interlocking and sealed side lap joint and fasten sheets as indicated on Drawings.

.8 Install necessary closure and trim or neoprene closures at openings and penetrations, fastening at 300mm c. Make cut-outs neatly by saw cutting.

.9 Rigidly connect all pre-coloured flashing pieces with specified colour matching fasteners at 300mm o.c. along length. Use preformed corner pieces and erect with ample allowance for thermal movement.

.10 Where welding has been performed on this Work, or field cutting or scratches have been made, field coat such areas with touch-up paint after thoroughly cleaning affected surfaces.

3.2 **CLEANING**

.1 Remove debris and surplus materials from Site upon completion of Work.

.2 Clean dirt, soil and misplaced sealants from metal siding panels with recommended cleaners and solvents.

.3 Repair and touch up with colour matching high grade enamel minor surface damage. Replace damaged panels and components that, in opinion of the Consultant, cannot be satisfactorily repaired.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 Prefinished glass fibre reinforced concrete panels indicated on drawings as fibre reinforced concrete panels, including concealed mounting system.

.2 Provide Z-girts, hat channel sub-girts and all related framing and accessories for the complete installation.

.3 Include insulation, fibreglass thermal spacers and vapour barrier at exterior applications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Clay Unit Masonry	Section 04 21 00
.2	Building Insulation	Section 07 21 00
.3	Air/vapour barrier	Section 07 26 00
.4	Sheet Metal Flashing & Trim	Section 07 62 00

1.3 REFERENCE STANDARDS

.1 CSA Group:

.1	CAN/CSA-S136	North American Specification for the Design of Cold-Formed Steel Structural Members
.2	CSA-S136 S1	Supplement 2004 to the North American Specification for the Design of Cold-Formed Steel Structural Members
.3	CSA-S136.1	Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members
.4	CSA-S157	Strength Design in Aluminum
.5	CSA-S157.1	Commentary on CSA S157-05, Strength Design in Aluminum

.2 ASTM International:

.1	ASTM C 1186	Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.
.2	ASTM E 84	Standard Test Method for Surface Burning Characteristics of Materials.
.3	ASTM E 330	Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.

1.4 QUALIFICATIONS

.1 Installation of fibre-cement wall panel system to be by manufacturer's construction forces, or by an accredited applicator under direct control and responsibility of manufacturer, and in accordance with manufacturer's instructions.

.2 installer to have minimum 10 years experience in design, fabrication and erection of wall panel systems, including 5 major projects in the previous 5 years. Submit proof of experience when requested by the Consultant.

1.5 DESIGN AND PERFORMANCE

.1 Rain Penetration: Design wall panel system based on “Rain Screen Principle” by National Research Council. System must drain moisture to the exterior.

.2 Wind Load: Design wall panel system to resist wind loads for this geographic location without vibration or rattling, deflection of panels or other detrimental effects on panels and fastening system.

.3 Structural and Thermal Movement:

.1 Design wall panel system to accommodate movement in the supporting structure and movement caused by thermal expansion and contraction of system components without resulting in detrimental effects such as bowing, oil canning, excessive stressing of fasteners or failure of joint seals.

.4 Panel Flatness Tolerance: 1.5 mm in either concave or convex direction, measured perpendicular to normal plane, based on lengths up to 3000mm. Panels with bumps and dents will not be accepted.

.5 Deviation in Erected Panels: Maximum deviation from horizontal and vertical alignment in installed panels to be 6mm in 6000mm. Maximum deviation from panel flatness to be 3mm in 1500mm in any direction for assembled units.

.6 Panel Removal: System to allow for removal of any individual panel without requiring the removal of adjacent work.

.7 Air/Vapour Barrier: Ensure continuity of air/vapour barrier. Seal all penetrations. Refer to Section 07 26 00.

.8 Design support system to be adjustable as may be required to accommodate deviations from dimensions indicated on drawings due to construction tolerances.

1.6 **SUBMITTALS**

.1 Submit shop drawings in conformance with Section 01 33 23.

.1 On shop drawings, clearly show and describe in detail, materials, finishes, sub-girt support, fastening devices, fastener spacing, flashings, trim, caulking, forming, erection details, and relationship to adjoining Work.

.2 Confirm all relevant dimensions on site. Indicate field dimensions on shop drawings. Ensure that depth of soffit is sufficient to enclose pipe from roof drain. Final installation details to be based on as-built conditions.

.3 Shop Drawings to be sealed by a professional structural engineer, registered in the Province of Ontario, attesting to the ability of the complete wall panel assembly to withstand applicable loading.

.4 Do not commence fabrication until in receipt of reviewed shop drawings.

.2 Submit manufacturer's data sheets on fibre-cement panels and concealed mounting system, including:

.1 Preparation instructions and recommendations.
.2 Storage and handling requirements and recommendations.
.3 Installation methods, including fastening patterns.

.3 Samples:
.1 Submit two (2) complete sets of colour samples and texture samples for colour selection by the Consultant.
.2 Submit two (2) verification samples of panels in each combination of colour and texture selected, minimum 150mm x 147mm in size, for approval prior to ordering of materials.

1.7 **MAINTENANCE**

.1 Provide maintenance data for the cleaning and care of finishes, to be included in Maintenance Manual.

.2 Include instructions for repair and removal of panels.

1.8 **DELIVERY, STORAGE, AND HANDLING**

.1 Do not deliver fibre-cement panels to site until Work is ready for their installation.

.2 Store products in manufacturer's unopened packaging, off the ground, flat and under cover in a dry place until installation.

.3 Keep materials dry and protect from freezing.

1.9 **WARRANTY**

.1 Warrant wall panel system for a period of **two (2) years** against defects, deficiencies and failure in materials or installation.

.2 Warranty shall include repair or replacement of siding that shows defects or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming or otherwise deteriorating beyond normal weathering.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Integrally coloured fibre-reinforced cementitious panels:
.1 FibreC Concrete Skin, as manufactured by Rieder Smart Elements GmbH, as supplied by Sound Solutions Inc., 13mm thick panels in sizes as indicated on drawings, in colours to be selected by the Consultant. CAAST panels as manufactured by Spring Valley Architectural Innovations and Contempo panels by Synstone International will also be accepted.
.2 Provide manufacturer’s proprietary mounting system. Panels to be face fastened with colour matched fasteners.

.2 Fasteners : Non-corrosive type as recommended by panel manufacturer; colour matched to panels where exposed.

.3 Sealants: Where sealant may be required, use 1 component polysulphide sealant or epoxy urethane in accordance with CAN/CGSB 19.13-M (latest edition). Select colour to match adjacent panels at exposed bead locations.

.4 Extrusions and extrusion clips for attaching panels to sub-structure to be purpose-made aluminum. Provide separator between aluminum extrusions and steel subgirts to prevent galvanic corrosion.

.5 Adjustable angles, Z-girts and channel subgirts to be manufactured from Z-275 galvanized steel and shall be designed to accommodate expansion and contraction, dynamic movement and design loading.

.6 Vapour Barrier: as specified in Section 07 26 00.

.7 Thermal Spacers:

.1 Provide thermal spacer brackets, 152mm deep; Cascadia Clips, by Cascadia Windows and Doors. Screws to be Master Gripper screws, with DT 2000 coating, by Leland Industries, supplied by Cascadia; minimum 150mm long.

.2 iClad thermal brackets by Spring Valley Architectural Innovations, type H for horizontal framing and type V for vertical framing, will also be accepted.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine work of other Sections upon which this work depends. Report any unsatisfactory conditions to the Consultant. Do not proceed until conditions are acceptable.

3.2 INSTALLATION

.1 Conform to Sections 07 21 00 and 07 26 00 for insulation and vapour barrier. Coordinate with other trades to maintain continuity of vapour barrier and thermal protection.

.2 Erect z-girts and thermal spacer clips in accordance with the instructions of the manufacturer of the thermal spacer clips, and the engineer’s framing design on the reviewed shop drawings.

.1 Thermal clips to be fastened to structural masonry wall at 600mm on centre vertically and 400mm on centre horizontally, unless otherwise required by the engineer responsible for the framing design.

.3 Erect panels and accessories in strict accordance with reviewed shop and erection drawings and manufacturer's instructions.

.4 Co-operate with other trades to ensure proper installation and anchorage of this Work. Use concealed fastenings only.

.5 Damaged panels and framing will be rejected.

.6 Install panels plumb, true, level and in alignment to the established lines and elevations.

.7 Where indicated on drawings, or as required to complete this work, provide closures, caps, fascias, covers and trims, in material matching colour, where exposed.

3.3 **CLEAN-UP AND PROTECTION**

.1 Remove debris and surplus materials from Site upon completion of Work.

.2 Clean dirt, soil and misplaced sealants from panels with recommended cleaners, in accordance with manufacturer's instructions.

.3 Protect installed products until immediately prior to occupancy of building by Owner.

.4 Replace any damaged panels before occupancy of building by Owner.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Provision of complete four ply hot applied built-up roof, including air/vapour barrier, insulation, membrane, membrane flashing and metal counter flashing, all in conformance to class A roofing system and CAN/ULC S126.

.2 The roofing shall be the approved system of one manufacturer, who shall provide the manufacturer's warranty specified herein.

.3 Roofing system shall be a system tested in accordance with CAN/CSA A123.21 for wind uplift resistance, as specified below.

.4 Confirm availability of all roofing products and place orders well in advance of anticipated date of roofing work. No additional costs will be permitted for substitutions required due to Contractor's failure to order materials in sufficient time to ensure delivery when required. Material shortages are expected to continue through the next year, and the Contractor is expected to be proactive in securing materials.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Steel Deck	Section 05 31 00
.2	Metal Fabrications	Section 05 52 00
.3	Wood Nailing Strips, Curbs	Section 06 10 00
.4	Steel Siding	Section 07 46 19
.5	Built-Up Bituminous Roofing System	Section 07 51 00
.6	Sheet Metal Flashing and Trim	Section 07 62 00
.7	Mechanical	Division 23

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1	ASTM C 1177M	Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.2 Canadian General Standards Board (CGSB).

.1	CGSB 37-GP-9Ma	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
.2	CGSB 37-GP-19M	Cement, Plastic, Cutback Tar.
.3	CGSB 37-GP-56M	Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing
.4	CAN/CGSB-37.29	Rubber- Asphalt Sealing Compound.
.5	CAN/CGSB-51.33	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractor's Association (CRCA)

.1 CRCA Roofing Specifications Manual.

.4 Canadian Standards Association (CSA)

.1	CAN/CSA A123.21	Standard test method for the dynamic wind uplift resistance of membrane roofing systems
.2	CSA A123.4	Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems
.3	CSA A231.2	Precast Concrete Pavers
.4	CSA O80.1-M	Specification of Treated Wood

.5 Underwriters Laboratories of Canada (ULC)

.1	CAN/ULC-S701	Thermal Insulation, Polystyrene, Boards and Pipe Covering
.2	CAN/ULC-S702.2	Standard for Mineral Fibre Thermal Insulation for Buildings
.3	CAN/ULC-S704	Standard for Thermal Insulation,Polyurethane and Polyisocyanu-rate Boards, Faced

.6 FM Approval Standard 4470 Single Ply, Polymer Modified Bitumen Sheet, Built Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Non-combustible Roof Deck Construction

1.4 SUBMITTALS

.1 Submit all required submittals as soon as possible after commencement of construction to ensure that materials can be ordered well in advance, to ensure availability in time for roofing work.

.2 Submit testing reports, issued by a certified materials testing laboratory, certifying that the roofing system has been tested in accordance with CSA A123.21 for dynamic wind uplift resistance. Test results shall demonstrate that the roofing system sustained wind uplift pressures in excess of:

.1 -1.0 kPa for the field of the roof
.2 -1.3 kPa for the edge of the roof; edge zone is 3.4m wide.
.3 -2.4 kPa for the corners of the roof

.3 Submit manufacturer's data sheets for roofing system to be installed, including a list of all products to be incorporated.

.4 Indicate in shop drawings flashings, control joints, tapered insulation details, roof drains and all re-quired roofing materials.

.5 Provide layout for tapered insulation. List materials used.

.6 Do not order materials until drawings have been reviewed and accepted by the Consultant. Sub-mittals to be in accordance with Section 01 33 23 of these specifications.

.7 Submit confirmation from supplier when roofing materials are ordered.

.8 Submit a draft copy of the roofing material manufacturer's warranty for review and acceptance by the Owner, prior to ordering roofing materials. Warranty shall be accompanied by a letter from the manufacturer confirming the roofing subcontractor as an approved installer of their products.

.9 Submit signed memo from manufacturer indicating acceptance of the inspection requirements as listed in Section

1.5 **QUALITY ASSURANCE**

.1 Work of this Section shall be performed by one of the Prequalified Roofing Subcontractors listed in Section 00 20 00, Instructions for Procurement.

.2 Roofing Subcontractor shall be approved by the roofing materials manufacturer as an installer of their products.

.3 Carry out Work in accordance with recommendations of the Ontario Industrial Roofing Contractors Association (OIRCA) and the Canadian Roofing Contractors Association (CRCA). Use only com-petent mechanics.

.4 Install all products in conformance with manufacturer's printed instructions.

1.6 **PRODUCT HANDLING**

.1 Store materials on raised platforms in approved manner at Site preceding application, and protect from inclement weather at all times. Roofing felts and other absorbent materials which become wet will be rejected.

.2 Store roofing felts, temperature sensitive materials and insulation in heated atmosphere 21°C for 24 hours before application in cold weather. Tarp all roofing felts. Supply manufacturers cold weather storage and application guideline if requested.

.3 Store sealants at minimum + 5°C.

1.7 **PROTECTION**

.1 Protect Work of other trades from roofing procedural damage. Cover vertical surfaces with tarpau-lins at hoisting locations.

.2 When using open flame in connection with this Work, maintain at all times 3-9 kg dry chemical fire extinguishers fully charged and in operable condition at location where open flames are in use.

.3 Locate kettles at grade level and minimum 2000mm from face of building.

.4 Protect completed portions of roofing from damage due to traffic and materials handling/storage un-til completion of Work.

1.8 **ENVIRONMENTAL CONDITIONS**

.1 Do not apply roofing materials during rain, fog, snow, or other damp or otherwise unsuitable surfaces.

1.9 WARRANTY

.1 Provide both a five **(5) year** Contractor's warranty and a **twenty (20) year** Manufacturer's warranty, as specified below.

.2 Furnish a **five (5) year** "Workmanship, Labour and Material" warranty on the complete roofing system, including all materials and labour against leakage, subsurface moisture, degradation of mate-rials and insulation thermal value, failure to stay in place, undue expansion, deformation, delamination, buckles, blisters, ridges and splitting seams.

.3 Contractor's warranty shall include the OIRCA standard warranty for the first two years, plus an additional three years.

.4 Provide a single source manufacturer's total system warranty for all work of this section against defects in materials and workmanship for a period of **twenty (20) years**. The written warranty shall be in a form approved by the Owner. The warranty shall cover all components of the roof system; including, but not limited to, the vapour retarder, roof insulation, roof membrane, flood coat/gravel and base flashings. The manufacturer shall supply all labour, materials, tools and equipment to repair and/or replace any material and/or workmanship defects, at no additional cost, for a period of **twenty (20) years**. The warranty shall not be pro-rated over the **twenty (20) year** period.

.5 The warranty period shall commence at the date of issue of the Certificate of Substantial Performance.

.6 Defective work shall include, but not be limited to: leaking, wind uplift, delamination of roofing materials, reduction of thermal value due to moisture in insulation, crazing and ridging. Dislodged sur-facing and degradation of colour that detracts from its performance or visual appearance will also be judged as defective work and will require correction under the Contract.

.7 All defective workmanship and material evident during the period of the Warranty must be repaired to restore the work to good condition and to the original intent of the Drawings and Specifications.

.8 Warranty must cover repairs to other work damaged resulting from defects in the roofing system and from any work to repair said defects.

.9 Within 24 hours of the Owners notification, repair any leaks into the building or roof assembly.

.10 The warranty shall include at no additional cost warranted roof inspection and preventative mainte-nance and general house keeping in years two (2), five (5), ten (10, fifteen (15) and twenty (20). All membrane defects noted during these inspections must be corrected at the manufacturers cost/labour.

1.10 INSPECTION AND TESTING

.1 An independent inspection and testing agency nominated by the Consultant will be appointed to in-spect and test roofing and sheet metal work.

.2 Arrange site meeting with Roofing Inspector and Consultant, maximum two weeks prior to commencement of Work on Site. Obtain Inspector's instructions re procedures to be followed.

.3 Co-operate with the Inspector and afford all facilities necessary to permit full inspection of the Work and testing of materials prior to their use. Act immediately on instructions given by the inspector. Where the inspector deems a change is required which will involve a change in cost, obtain Consultants written approval BEFORE proceeding.

.4 Make cut-outs for testing purposes when required and make good roofing at no extra cost to the Owner.

.5 Pay Inspection and Testing Agency from cash allowance in Division 01.

.6 Manufacturer inspections to be completed at a minimum of twice per week for the entire project duration. Inspection reports from manufacturer are to be issued to contractor, general con-tractor, owner, consultant and architect a minimum of 48 hours after each inspection. No addi-tional costs will be accepted for manufacturer inspections.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

.1 Built-up roof system including surfacing, membrane, coverboard, base insulation, underlayment board, accessories, flashings and vapour retarder on various structural decks.

.2 Flashings and Fastening: Provide base flashings, perimeter flashings, detail flashings, and component materials and installation techniques that comply with requirements and recommendations of the following:
.1 CRCA Roofing Manual for construction details and recommendations.
.2 SMACNA Architectural Sheet Metal Manual for construction details.

2.2 PERFORMANCE REQUIREMENTS

.1 General Performance: Roofing system shall remain weathertight and withstand, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, or installation.

.2 Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

.3 Exterior Fire-Test Exposure:
.1 CAN/ULC S107, Class A

.4 Roof System in compliance with CSA123.21.

.5 Installation is strict accordance with manufacturers installation guide.

2.3 PRIMER

.1 High penetrating, solvent based primer to enhance adhesion between various substrates and asphalt adhesives. Basis of Design: Tremprime LV

2.4 **VAPOUR RETARDER**

.1 Hot Applied: Twp plies #15 organic roofing felt.
- .1 Hot Applied Adhesive: Asphalt Type III.
- .2 Basis of Design: IKO #15 Perforated Felts.

2.5 **UNDERLAYMENT BOARD**

.1 Underlayment Board: Glass faced, gypsum roof underlayment board to ASTM C1177.
- .1 Flute Spanability, pass @ 125mm, ASTM E661.
- .2 Compressive Strength (PSI), Minimum, 900, ASTM C473.
- .3 Thickness: 13mm
- .4 Basis of Design: Dens Deck Prime by Georgia Pacific OR CGC Securock.

.2 Fasteners/Plates: As approved in wind uplift testing report.

2.6 **ROOFING MEMBRANE**

.1 Base Sheet: Trilaminate composite felt, non perforated, polyester/glass/polyester reinforced sheet, dusted with fine mineral surfacing on both sides and modified with SBS rubber. To meet the requirements of ASTM D 4601, type II with the following properties:
- .1 Tensile Strength, minimum ASTM D 146, MD 40 kN/m, XMD 45 kN/m.
- .2 Tear Strength, minimum, ASTM D 5147, MD 1.7 kN, XMD 1.9 Kn.
- .3 Elongation, minimum, ASTM D 5146, MD 6%, XMD 7%.
- .4 Thickness, minimum: 1.6mm.
- .5 Plies: 1
- .6 Basis of Design: BURmastic Composite Felt HT.

.2 Ply Sheets: Type IV non rotting glass ply sheets to meet or exceed ASTM D 2178, type IV.
- .1 Plies: 3

2.7 **ADHESIVES**

.1 Membrane Interply/Insulation Adhesive: Asphalt, Type III, to ASTM D 312. Basis of Design: Tremco Premium III Asphalt.

.2 Top Pour/Flashing Membrane Adhesive: SEBS polymer-modified asphalt to meet or exceed the requirements of ASTM D 6152.
- .1 Elongation, minimum, ASTM D 412, 900%.
- .2 Low Temperature Flexibility, minimum, ASTM D 3111, -8 Deg C.
- .3 Basis of Design: Thermastic 80.

.3 Insulation Adhesive (Foam – Where Applicable): Two-part, 1:1 ratio, solvent-free, elastomeric urethane adhesive. Basis of Design: Tremco Low Rise Foam or One Step Foamable Adhesive by HB Fuller.

2.8 **ROOFING MEMBRANE ACCESSORIES**

.1 General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing.

.2 Flexible Flashing Sheet: Flexible flashing sheet consisting of EPDM/SBR polymers reinforced with a polyester woven scrim.
- .1 Breaking Strength, minimum, ASTM D 751, MD 1400 N, XMD 1250N.
- .2 Tear Strength, minimum, ASTM D 751, MD 300 N, XMD 340N.
- .3 Low Temperature Flexibility, pass, ASTM D 2136, -50 Deg C.
- .4 Thickness, maximum, 1.3mm.
- .5 Basis of Design: TRA Sheeting

.3 Base Flashings: #15 Felt, Plies: 2.

.4 Polymer-Modified Mastic (Vertical Grade): Polymer-modified single component roof elastomer.
- .1 Tensile Strength, minimum, ASTM D 412, 207 kPa.
- .2 Elongation @ 25 Deg C, minimum, ASTM D 412, 1000%.
- .3 Elongation, @ - 34 Deg C, minimum, ASTM D 412, 100%.
- .4 Low Temperature Flexibility @ -40 Deg C, ASTM D 3111, Pass.
- .5 Basis of Design: Polyroof LV

.5 Stripping Reinforcement Fabric: non-shrinking, non-rotting, vinyl coated, woven glass bonded mesh.
- .1 Tensile strength at 70°, minimum:
- .2 Warp threads: 65 lf/in (289 N)
- .3 Filling threads: 75 lbf/in (311 N)
- .4 Basis of Design: BURmesh

.6 Sealant: High movement, medium modulus, uv-stable polyurethane sealant. Basis of Design: Tremseal Pro or Dymonic 100.

.7 Insulation Cant Strips: ASTM C208, Type II, Grade 1, cellulosic-fiber insulation board.

.8 Cant Strips: Perlite cants to Can/CSA-A247, 75mm.

.9 Fasteners: Factory-coated steel fasteners and metal or plastic plates designed for fastening roofing components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.

.10 Termination Bar: 1 mm aluminum, with pre-punched holes at 406 mm o.c., metal snap-on cover, and sealant cup.

.11 Primer: Asphaltic based, adhesion enhancing primer to improve bond between asphalt based materials with wood, concrete and metal to ASTM D 41. Basis of Design: Tremprime LV.

.12 Wood Blocking: Douglas Fir dimensional lumber, dimensions to suit application.

.13 Batt Insulation: Stone Wool.

.14 Flue Filler: Stone Wool pre cut flute filler. Basis of Design: Protec Metal Flute Filler.

.15 Vent Pipe & Conduit Flashing: SJ-39 aluminum pre-insulated stack jacks 483mm high, complete with EPDM triple pressure grommet seal and EPDM base seal, by Thaler Metal Industries Inc.

.16 Mechanical & Electrical Flashings:
- .1 Thaler Model MERS-600 for single uninsulated pipe.
- .2 Model MERS-605A for two pipes, and
- .3 Model MERS-630 for single, large diameter insulated pipe
- .4 Thaler MEF-9 for gas pipe flashing
- .5 Thaler MEF-2 and MEF-AE4 for single/multiple flexible conduit flashing
- .6 Thaler MEF-AE1 for rigid conduit flashing
- .7 Refer to mechanical and electrical drawings for locations of pipes and conduits penetrating roof.

.17 Ladder supports: Thaler model ARS-500

.18 Split Flashings:
- .1 Thaler model SPJ-3 Square, Split Flashing 457 mm high for post sizes as noted on drawings, 26 ga. sleeve with gauge of cap to suit, Type 304 stainless steel;
- .2 to CSA B272;
- .3 with EPDM triple pressure grommet seal around cap and continuous EPDM seals at split junctures of sleeve and deck flange, bituminous painted deck flange, matching split cap with overlapped and s.s. bolted closure design

.19 Expansion Joint Assemblies: JM Expand-O-Flash factory fabricated bellows type expansion joint covers, or equal by InPro.

2.9 ROOF INSULATION

.1 General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with roofing.

.2 Insulation: Closed cell polyisocyanurate, fiber reinforced facer, manufactured in accordance with ASTM C 1289, Type II, Class 1, Grade 2 (20psi).
- .1 Thickness: 150mm (75mm per layer)
- .2 Total Layers: 2
- .3 Basis of Design: Atlas AC Foam III

.3 Coverboard: High density, asphalt impregnated wood fibre to CAN/ULC S706.1, Type II, Class
- .1 Thickness: 13mm. Basis of Design: BP Esgard coated all six sides.

.4 Tapered Insulation: Isocyanurate to ASTM, Type II, Class 1, Grade 2. By Posi Slope, Accuplane or approved equal.
- .1 Drain Sumps: 2000mm x 2000mm.
- .2 Backslope: As indicated on drawings.
- .3 Crickets: As indicated on drawings.

.5 Insulation Adhesive: Asphalt Type III.

2.10 SURFACING

.1 Tp Pour: SEBS polymer-modified asphalt to meet or exceed the requirements of ASTM D 6152.
- .1 Elongation, minimum, ASTM D 412, 900%.
- .2 Low Temperature Flexibility, minimum, ASTM D 3111, -8 Deg C.

.2 Aggregate: 6mm to 13mm 100% snow white calcite. Washed free of fines , moisture, debris and splinters. By Coloured aggregates or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine surfaces and site conditions, with Installer, for compliance with requirements, prior to commencing work.
- .1 Verify surfaces and site conditions are ready to receive work.
- .2 Verify deck is supported and secure.
- .3 Verify that roof openings and penetrations are in place, curbs are set and braced, blocking, curbs, wood cants, and nailers are anchored to roof deck at penetrations and terminations, that wood nailers match insulation thickness, and roof drain bodies are properly installed.
- .4 Verify deck surfaces are clean, dry, and free of snow or ice.

.2 Report: Provide written report to Owner indicating conditions that do not meet requirements.

.3 Proceed with installation once non-complying conditions have been corrected.

3.2 PREPARATION

.1 Clean substrate of substances and projections detrimental to roofing installation according to roofing manufacturer's written instructions.

.2 Prevent materials from entering roof drains and conductors and from contacting surfaces of other construction.

.3 Substrate-Joint Penetrations: Prepare joints as required to prevent asphalt and adhesives from penetrating joints, entering building, or damaging roofing components or other construction.

.4 Ensure curb heights achieve 300mm flashing height above finished roof surface.

.5 Ensure parapets achieve minimum 50mm flashing height above top of cant throughout.

.6 Only utilize portions of the property as previously allocated by the facility owner, conceal all materials in a secure staging area and never leave operating equipment running while not attended to.

.7 Supply owner with adequate notice for crane lifts as required.

.8 Maintain roof in good order throughout duration of project. Protect roof system from construction abuse and staging of other materials.

.9 Direct water and/or precipitation to plumbing or away from facility façade during construction period.

.10 Protect all materials from damage throughout construction process.

3.3 **INSTALLATION, GENERAL**

.1 Install roofing membrane system components according to roofing manufacturer's written instructions, applicable referenced roofing system approval, and approved shop drawings.

.2 Cooperate with testing agencies and personnel engaged or required to perform services for installing roofing.

.3 Install roofing as per manufacturers cold-weather installation guidelines when temperatures are below 0 Deg C.

3.4 **FLUTE FILLER (ACCOUSTICAL STEEL DECK)**

.1 Ensure deck flutes are free of debris, sediment or moisture.

.2 Loose lay stone wool insulation in flutes of steel deck.

.3 Apply pre fabricated flute filler in continuous application to fully conceal all flutes within intended application area.

.4 Temporary ballast flute filler from movement or displacement.

3.5 **UNDERLAYMENT BOARD (STEEL DECK)**

.1 Mechanically fasten underlayment board to underlying deck with a minimum of eight (8) fasteners per board and increase fastening pattern as required at perimeters and corners as per manufacturers wind uplift report.

.2 Where indicated adhere underlayment board in continuous beads of low rise foam insulation adhesive. Apply insulation adhesive with a maximum spacing of 300 mm o.c. Increase adhesion pattern as required at perimeters and corners as per manufacturers wind uplift report.

.3 Install boards with staggered joints and free of warp, defect or damage.

.4 Stagger all end joints by a minimum 900mm.

3.6 **VAPOUR RETARDER**

.1 Install two plies of #15 felt applied in asphalt at rate of 1.25kg/m2.

.2 Install all vapour retarders to envelope insulation package by minimum of 100mm.

.3 Install all vapour retarders free of damage, tears or defects.

.4 Apply skim coat of asphalt across entire vapour retarder to prevent moisture from penetrating the felts.

.5 Tie in vapour retarder to existing building envelope as provided.

3.7 INSULATION

.1 Install base course of polyisocyanurate insulation in full moppings of asphalt applied at 1.25kg/m2.

.2 Install in continuous row with adjacent rows off set by minimum one half board length.

.3 Ensure all insulation is installed free of warp, damage, defect or moisture throughout the roofing project.

.4 Install secondary layer of polyisocyanurate insulation in full moppings of asphalt applied at 1.25kg/m2.

.5 Install tapered insulation in full moppings of asphalt applied at 1.25kg/m2.

.6 Install coverboard in full moppings of asphalt applied at 1.25kg/m2.

.7 Insulation Installation requirements:

- .1 Install all insulation free of wrap, damage, defect or moisture damage.
- .2 Only install as much insulation that can be made water tight by end of each day. Minimum requirement is four plies of membrane applied, base flashings installed and full temporary water cut off applied.
- .3 Install each layer with off-set joints by minimum of 600mm.
- .4 Butt boards together without gaps and cracks that will prevent asphalt retention.
- .5 All insulation is to be applied and stored in strict accordance with the manufacturers written guidelines.

3.8 MEMBRANE

.1 Install one ply base sheet, and three plies glass felt in strict accordance with manufacturers installation manuals and spec data sheets.

- .1 Each ply to be fully embedded in full moppings of asphalt applied at 1.25kg/m2.
- .2 Install plies starting at low point so water will run parallel or over ply seams, but not against.
- .3 Install all plies free of wrinkles blisters and/or fishmouths.
- .4 Do not walk on plies until asphalt has fully set up, all areas that receive insufficient asphalt will require an additional glass ply.
- .5 Extend all plies to top of cant.
- .6 Ensure base flashing plies are installed at end of each day.

.2 Do not use installed membrane as working surface or storage area for any materials.

.3 Do not apply flood coat until membrane has been inspected and repairment has been completed as instructed by the inspector.

3.9 FLASHINGS

.1 All non-bituminous substrates are to be primed prior to application of bituminous materials at manufacturers published coverage rate.

.2 Flashings to consist of two plies #15 felt in asphalt and one flexible flashing membrane in SEBS asphalt.

.3 Flashing Membrane: Install flexible flashing sheet at roof edges and at penetrations through roof. Secure to substrates according to roofing manufacturer's written instructions.
- .1 Prime substrates with primer as required.
- .2 Flashing Sheet Application:
  - .1 All flashings are to extend a minimum of 150mm beyond toe of cant and leading edge to be concealed with reinforcing mesh and surfacing asphalt.
- .3 Unless stated otherwise, extend base flashing up walls or parapets a minimum of 300 mm above insulation and 150 mm onto field of roofing.
- .4 Mechanically fasten top of base flashing securely at terminations and perimeter of roofing. Termination bars must be applied same day as flashings are applied.
- .5 Overcoat termination bar to prevent any moisture infiltration.
- .6 Hand press flashing membrane into adhesive to ensure full adhesion is achieved.
- .7 Reinforce all vertical seams with polymer-modified mastic and reinforcing mesh. Reinforcement must carry entire length of membrane seam.
- .8 Reinforce leading edge of flashing membrane with application of reinforcing mesh mopped in polymer-modified asphalt.
- .9 Seal top termination of base flashing with a metal termination bar.
- .10 Where flashing membrane extend and terminated vertically beyond 300mm, utilize cold-applied flashing adhesive.
- .11 Flashing Membrane to be adhered in polymer-modified asphalt.

.4 Low Parapet Wall Flashing
- .1 Adhere elastomeric sheeting completely to flashing surface, cant, and roofing with flashing adhesive.
- .2 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.
- .3 Extend elastomeric sheeting up and over parapet at least 75 mm and face nail with 38 mm common roofing nails, 200 mm OC.

.5 Flashing At Edges and Gutters
- .1 Fabricate and install new one piece gutter with downspouts. Slope gutter to downspouts.
- .2 Prior to setting and nailing horizontal flanges of gutter, uniformly trowel a 1.5 mm thick layer of cold flashing adhesive to roofing surface designated to receive metal flange.
- .3 Nail flange to wood blocking 75 mm OC, staggered.
- .4 Prime metal flange with asphaltic primer.
- .5 Adhere sufficiently wide strip of elastomeric sheeting completely to flashing surface with flashing adhesive. Ensure complete bond and continuity without wrinkles or voids lap sheeting ends 100 mm and adhere with flashing adhesive. Elastomeric sheeting to cover gravel stop completely and overlap onto adjacent roof a minimum of 150 mm.

.6 Wall Flashing
- .1 Cut new reglet joint where reglet not present 300mm above the roof surface.
- .2 Do not cover existing weep holes.
- .3 Adhere elastomeric sheeting completely to flashing surface, cant and roofing with flashing adhesive.
- .4 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.

.5 Elastomeric sheeting width: sufficient to extend at least 150 mm beyond toe of cant onto roof surface and 300 mm above the roof surface.
.6 Secure top of elastomeric sheeting to vertical plane with termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.
.7 Ensure wall envelope extends onto flashing sheet by a minimum of 100mm to continuously shed water.

.7 Building Expansion Joints
.1 Fill joint with loose insulation.
.2 Provide 13 mm (1/2 inch) thick plywood to top of wood blocking, secured one side only.
.3 Apply foam rubber or 25 mm thick mineral fibre insulation to top of plywood.
.4 Install elastomeric sheeting centred over expansion joint.
.5 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
.6 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.8 Expansion Joint at Wall
.1 Extend vapour retarder from deck level up wall sufficiently and secure to wall.
.2 Fill joint with loose insulation.
.3 Install blocking, sheathing and compressible insulation as detailed on Drawings.
.4 Adhere elastomeric sheeting completely to flashing surface, cant and roofing with flashing adhesive.
.5 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.
.6 Elastomeric Sheeting Width: sufficient to extend at least 150 mm beyond toe of cant onto roof surface and 200 mm above the roof surface.
.7 Secure top of elastomeric sheeting to vertical plane with a termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.9 Area Divider
.1 Install elastomeric sheeting centred over area divider extending onto roof membrane a minimum of 150 mm beyond toe of cant on either side.
.2 Fully adhere sheeting with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
.3 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.10 Control Joint
.1 Install elastomeric sheeting centred over joint.
.2 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
.3 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.11 Curb Flashing
.1 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
.2 Mechanically fasten sheeting on top face of curb.
.3 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.4 If membrane does not terminate to inside face of curb, secure top edge with a termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.12 Projection Flashing
- .1 Prime top and bottom side of aluminium flange.
- .2 Set flange in uniform bed of vertical grade stripping adhesive.
- .3 Apply flashing adhesive to prepared area and Provide aluminum base over pipe and set into the flashing adhesive.
- .4 Install penetration flashing in strict accordance with manufacturers written instructions.
- .5 Ensure seals are tight fit, caulking is not acceptable.
- .6 Provide clamp around pipe and rubber cap. Prime flange.
- .7 Install elastomeric sheeting with stripping ply adhesive and membrane.
- .8 Cover flange completely with 900mm x 900mm target patch.
- .9 Remove wrinkles and voids. Lap flashing ply ends 100 mm.

.13 Roof Drain
- .1 Install drain assembly in accordance with manufacturer's written installation guidelines.
- .2 Prime bottom and top sie of flange.
- .3 Set flange in 6mm thick trowelling of polymer-modfieid mastic (vertical stripping mastic).
- .4 Plug and seal drain to prevent water entry until service connection is completed. Do not allow water to accumulate to jeopardize roof system or weight load of structure.
- .5 Provide 900 x 900 mm size elastomeric sheeting reinforcement, centred over drain; and fully adhered with flashing adhesive. Remove wrinkles and entrapped air.
- .6 Apply mastic to exposed edge of membrane inside the drain opening.
- .7 Clamp flashing collar to drain in bed of flashing adhesive.
- .8 Trim excess sheeting within drain.
- .9 Install three course of polymer-modified mastic and mesh around leading edge prior to top pour application.

.14 Scuppers:
- .1 Extend field membrane into throat of scupper in all directions.
- .2 Apply scupper flange into bed of vertical grade stripping mastic and fasten into place.
- .3 Conceal flange in all directions with flashing membrane adhered in cold-applied flashing adhesive.
- .4 Tie in leading edges with stripping adhesive and mesh.

.15 HSS Posts
- .1 Utilize liquid applied flashing system at all HSS posts throughout the site.
- .2 Ensure posts are free of debris, sedimanet or moisture prior to application.
- .3 Ensure area surrounding the posts is free of materials or conditions that may effect adhesion and performance of the liquid applied flashing.
- .4 Apply liquid applied flashing base coat extending min 200mm onto the roof surface and 300mm vertically.
- .5 At all transition points immediately embed polyster reinforcing fabric into wet base coat.
- .6 Overcoat liquid applied flashing base coat and allow to cure.
- .7 Review application for continuous seal and free of fishmouths, wrinkles or other characteristics that may jeopardize performance.
- .8 Allow base coat to cure.
- .9 Apply liquid applied top coat to fully conceal base coat at rate indicated by manufacturer.

3.10 **SURFACING**

.1 Prior to applying flood coat ensure roof surface is swept clear of all construction debris, areas of heavy sediment may require primer. Repair all deficiencies, do not apply flood coat until inspector has examined the roof membrane.

.2 Prior to applying flood coat, install roof protection pads where indicated on drawing in cold-applied flashing adhesive.

.3 Apply polymer-modified asphalt over entire roof surface at rate of 2.8kg/m^2, immediately broadcast calcite aggregate into polymer-modified asphalt while still hot at rate of 24.4kg/m^2.

.4 Apply double pour of top pour and aggregate at all roof corners. Sweep loose aggregate, prime surface prior to double pour.

.5 Rake aggregate neatly for clean/even coverage over entire roof surface, where aggregate is not adhered into top pour additional top pour will be required.

3.11 **FIELD QUALITY CONTROL**

.1 Roofing Inspector: Owner will engage a qualified roofing inspector to perform roof tests and inspections.

.2 Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of every other production day on site to perform roof tests and inspections and to prepare start up, interim, and final reports.

.3 Repair or remove and replace non-complying components of roofing. Retest to demonstrate compliance. Reports to be delivered to owner, architect, consultants and contractor minimum 24 hours after each inspection.

3.12 **PROTECTING AND CLEANING**

.1 Protect roofing from damage and wear during construction according to manufacturer's instructions.

.2 Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, and repair or reinstall roofing to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

.3 Clean overspray and spillage from adjacent construction.

.4 Paint all gas lines yellow with two courses of exterior grade yellow paint.

.5 Remove all construction waste, material and equipment from site.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Flashing Inserts	Section 03 30 00
.2	Through-Wall Flashing	Section 04 21 00
.3	Built-Up Bituminous Roofing	Section 07 51 00
.4	Joint Sealants	Section 07 92 00

1.2 REFERENCES

.1 ASTM International

.1	ASTM A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.2	ASTM A924M	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
.3	ASTM D41	Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
.4	ASTM D2092	Standard Guide for Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting

.2 Canadian Sheed Steel Building Institute (CSSBI)

.1	CSSBI S8	Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products (Canadian Sheet Steel Building Institute)
.2	CSSBI 20M	Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications
.3	CSSBI SSF No. 6	Metallic Coated Sheet Steel Products for Structural Building Products

.3 Sheet Metal & Air Conditioning Contractors's National Association

.1 SMACNA Architectural Sheet Metal Manual, 7th Edition

1.3 QUALITY ASSURANCE

.1 Work of this Section shall be executed by same trade specialists installing membrane roofing, in accordance with practices and details of Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Architectural Sheet Metal Manual.

1.4 SUBMITTALS

.1 Submit typical 300 mm long sample of flashing indicating design method of locking and method of anchoring and corner section fabricated from materials specified.

1.5 WARRANTY

.1 Contractor hereby Warrants that Work performed under this Section shall remain free against leakage, joint spalling and similar defects in accordance with General Conditions, but for a period of **five (5) years**.

1.6 **INSPECTION AND TESTING**

.1 Inspection and testing of this Work is included in inspection and testing of roofing and roof insulation.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Metal Flashing: Minimum 26 ga. prefinished sheet steel supplied in flat sheet stock

.1 PMF 1:
- .1 Metallic Series, 4 coat system by Baycoat or Valspar, colour QC 2624 "Bright Sliver"
- .2 Location: Cap flashing at upper roof area parapet and elsewhere as indicated on drawings.

.2 PMF 2:
- .1 Perspectra Series, 4 coat system by Baycoat or Valspar, colour QC 229.
- .2 Location: Cap flashing at main building parapet and elsewhere as indicated on drawings.

.3 Rain Water Leader (RWL)
- .1 100 x 100 sheet steel leader c/w convector box. Colour to match PMF1.

.2 Nails: Chromium/Nickel, No.12 x 25mm flat headed, annular threaded stainless steel.

.3 Cleats, Starter Strips and Back-up Plates:
- .1 Same metal and thickness as metal flashing;
- .2 cleats minimum 38mm wide and interlocked with metal flashing; starter strips, continuous.
- .3 Back-up plates minimum 300mm wide where adjacent lengths of cap flashing meet, fabricated of same material thickness and finish as cap flashing.

.4 Screws, Bolts and Expansion Shields:
- .1 Non-ferrous metal compatible with adjacent surfaces.
- .2 Exposed fastenings shall be same materials as metal surfaces through which they penetrate.
- .3 Use cadmium plated screws with round heads suitable for soldering for galvanized Work.

.5 Solder: ASTM B32-70, 50% block tin and 50% pig lead.

.6 Flux: Commercial hydrochloric acid cut with zinc, or 10%-20% solution of orthophosphoric acid in water, for use with galvanized Work.

.7 Sealants: As specified in Section 07 92 00.

.8 Asphaltic Primer: CGSB 37-GP-9M and ASTM D41; Henry/Bakor "Primer 910-01", quick drying asphaltic base paint.

PART 3 - EXECUTION

3.1 FABRICATION

.1 Where possible, shop fabricate flashing components in accordance with applicable requirements of SMACNA Architectural Sheet Metal Manual.

.2 Carry out fabrication in clean shops, located away from areas where carbon steel is torch cut, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded in prefinished surfaces. Clean tools and dies which have been used on carbon steel prior to fabrication to prevent contamination of surface with carbon steel dust.

.3 Form sheet metal on bending brake. Perform shaping, trimming and hand seaming on bench, where practicable, using proper sheet metal working tools.

.4 Form sections square, true and accurate to size. Flashings shall be free from distortion, waves, twists, buckles or other defects detrimental to appearance and performance.

.5 Make allowances for thermal movement when forming, installing, interlocking and soldering sheet metal Work to avoid buckling, fullness of metal straining of joints or seams. Maximum length of flashing pieces; 2400mm. Double back exposed edges at least 12mm for appearance and stiffness.

.6 Fabricate flashings, copings, closures, plastic boxes, pipe sleeves and flashings for roof mounted equipment to details shown, unless otherwise indicated.

.7 Wipe and wash clean, soldered joints immediately after joint is soldered to remove acid.

.8 Where soldered joints are absolutely necessary and where approved for use in prepainted metal, clean paint off both surfaces before soldering for minimum area necessary.

3.2 INSTALLATION

.1 Carry out Work in accordance with industry standard sheet metal practice with joints lapped, locked, cleated with "S" cleats and caulked or soldered as required. Hem exposed edges 12mm. Type of joints used shall be adequate for various conditions, subject to approval.

.2 Fabricate exposed fastening, where used, in such a manner as to prevent water penetration at point of fastening.

.3 Provide starter strips where indicated or required to present true, non-waving, leading edge. Anchor to back-up to provide rigid, secure installation.

.4 Make end joints where adjacent lengths of metal flashing meet using 300mm. long back-up flashing secured in place before installing flashing. Apply beads of caulking compound on face of back-up plate to seal ends of metal flashing. Leave 12mm wide space between end of adjacent lengths of metal flashings. Fabricate back-up of same material and finish as metal flashing with which it is being used. Make back-up plate exact profile of flashing allowing for thickness of flashing joints.

.5 Form metal fascia with inner edge extended over fascia top and down cant to meet roofing aggregate. Nail with roofing nails and neoprene washers at 300mm C. Avoid placing nails in face of fascia, through membrane or flashing.

.6 Interlock counter flashing pieces with prepainted metal base flashing and fold locking seam into position ensuring complete sealing. Continue counter flashing down to hemmed and sprung position at base of cant and junction of aggregate.

.7 Provide underlay of resin sized paper under sheet metal installed over masonry, concrete or wood. Lay underlay dry as sheet metal Work is installed. Secure in place and lap joints 100mm.

.8 Coordinate with forces installing fibre reinforced concrete panels. Provide separation between dissimilar metals.

.9 Imperfections in sheet metal Work such as holes, dents, creases, or oil-canning is cause for rejection.

.10 Repair damaged sheet metal Work, wash entire installation down, and leave in neat condition.

.11 Provide all flashings required for proper execution and completion of the Work in acceptable manner including metal flashing around mechanical and other equipment occurring on roof.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Sprayed fireproofing applied directly to structural steel framing members where shown on the Drawings and where required by Building Code.

.2 Requirements of regularity agencies:

.1 Provide materials and application procedures which have been tested and listed by U.L.C., and are acceptable to the Building Department for the hourly fire protection. UL (cUL), WH, and FM tested products/designs, certified tested for Canada, will be accepted subject to their approval by the Building Department.

.2 Submit copies of tested assemblies to be used on the project to building inspector. Keep copies on site.

.3 Selection of Tested Assemblies

.1 Contractor shall select tested assemblies for use on this project, subject to the requirements of Authorities Having Jurisdiction and these specifications. All materials used shall be those included in the tested assemblies used.

.4 Spray fireproofing is to be used for fireproofing which will be concealed from view. Members which will be permanently exposed to view are to be fireproofed with intumescent paint.

1.2 RELATED SECTIONS

.1	Firestopping and Smoke Seal	Section 07 84 00
.2	Gypsum Board	Section 09 29 00

1.3 REFERENCES

.1 Underwriters Laboratories of Canada:

.1	CAN/ULC-S101	Standard Methods of Fire Endurance Tests of Building Construction and Materials
.2	CAN/ULC-S102	Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
.3	BXUVC-ULC	Guide Info Fire-resistance Ratings

.2 UL:

.1	CHPX7-UL	Guide Info, Spray-applied Fire-resistive Materials Certified for Canada

.3 ASTM International:

.1	ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials
.2	ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials.

.4 The Association of the Wall and Ceiling Industry (AWCI):

.1	Technical Manual 12-A	Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; an Annotated Guide - 115

1.4 **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 manufacturer as having been provided the necessary training to install fireproofing products in accordance with the specified requirements.

.3 Contractor and applicator shall assume responsibility for ensuring the member or assembly being fireproofed conforms to the specifications of the tested fireproofing design being utilized.

1.5 **SUBMITTALS**

.1 Submit proposed tested assembly designs to Consultant for approval before proceeding.

.1 Details shall include galvanized steel mesh, welded to steel, as required in item 3.1.3, below.

.2 If subcontractor wishes to omit steel mesh, submit request to Consultant, together with evidence that the primer used is compatible with the fireproofing materials and that the surface has been adequately cleaned.

.2 Submit product data sheets for applied fireproofing products proposed for use; products to be in accordance with submitted designs.

.3 Upon completion of the fireproofing application the General Contractor must submit a certificate stating what system of fireproofing material was applied and that it complies with the fire protection requirements.

1.6 **HANDLING**

.1 Deliver materials, other than those normally shipped in bulk form, in unopened containers being their manufacture's label showing compliance with Building Code requirements.

.2 Comply with manufacturer's printed recommendations for product handling, storage and protection.

1.7 **JOB CONDITIONS**

.1 Environmental requirements: Comply with manufacturer's printed recommendations for ambient temperature requirements before, during and after the installation of the sprayed fireproofing.

.2 Provide natural or mechanical ventilation to properly dry this work during and after its application in confined areas.

1.8 **TESTING AND INSPECTION**

.1 Arrange for inspection of applied fireproofing by the Testing and Inspection company appointed by the Owner. Payment shall be through the Cash Allowance included in the Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Sprayed fireproofing:
- .1 Monokote MK6 as manufactured by GCP Applied Technologies Inc.; A/D Type FP or Type 5MD, both as manufactured by A/D Fire Protection Systems; or Blaze-Shield II by Cafco/Isolatek International.
- .2 Products used shall be in accordance with the tested assemblies.

.2 Primers: Use only products listed in the tested assemblies, applied in accordance with the provisions of those tested assemblies. Do not use primers unless recommended as part of the assemblies used.

.3 Water: Clean and fresh, free of substances harmful to the fireproofing mix.

2.2 MIX

.1 Proportion mix to comply with requirements of regulatory agencies for the required hourly fire resistance ratings. Add mixing water only with calibrated equipment.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Inspect adjacent construction and make sure that all conditions detrimental to the timely or proper execution of this work have been corrected before proceeding.

.2 Clean steel surfaces of all grease, oil and other foreign matter which would prevent the proper adhesion of the sprayed fireproofing.

.3 Preparation of painted surfaces:
- .1 Fireproofing shall not be applied to painted or primed structural steel or steel deck unless specifically permitted by the ULC design approved for use.
- .2 If the painted or primed steel is not an approved substrate for the products specified in the assembly, steel mesh must first be secured to the surfaces in accordance with the ULC requirements.
- .3 Weld galvanized steel mesh to all steel beams and steel deck to be fireproofed, to ensure bond between structure and fireproofing materials. This requirement will be strictly enforced, unless the Contractor has obtained permission from the Consultant to omit the steel mesh, as outlined in subsection 1.4, Submittals, above.
- .4 Painted steel joists generally do not require such additional measures prior to applying fireproofing, but Contractor is responsible for confirming this with the manufacturer of the materials proposed for use.

3.2 SPRAYED FIREPROOFING

.1 Do not apply sprayed fireproofing until all hangers and other attachments to the members being fireproofed have been installed, and steel mesh has been welded to structural steel.

.2 Do not spray junction boxes or wiring or any other item that will require future servicing.

.3 Protect adjacent surfaces and equipment from being damaged by the application, overspray, fall-out and dusting of fireproofing material. Remove excess and spillage promptly.

.4 Comply with manufacturer's printed instructions and recommendations for mixing, handling and machine application of fireproofing material.

.5 Mix sprayed fireproofing using mechanical mixing equipment, except hand mixing will be permitted for small applications requiring less than 1 bag of cementitious materials.

.6 Apply the sprayed fireproofing at the various locations in the thicknesses required to obtain the required fire resistance ratings. Take care to spray the material completely into inverted corners. Cover substrates in a monolithic blanket of the uniform density, texture and thickness necessary to achieve the required hourly protection.

.7 Where required to apply fireproofing in more than one coat to obtain necessary thickness, apply first coat 13mm to 19mm thick allow to set and partially dry, and follow with a second coat to bring the fireproofing to the necessary thickness. Carefully follow the manufacturer`s printed instructions for the time delay required for doubleback operation.

.8 Fireproofing application must comply strictly with all requirements of the specifically listed Underwriters Laboratories of Canada test design assemblies.

3.3 **FIELD QUALITY CONTROL**

.1 Take depth-gauge measurements, at maximum 3m on centre, as the work progresses to verify installed material thickness.

.2 Take measurements along each surface covered with fireproofing.

.3 Apply additional fireproofing materials where measurements indicate thicknesses less than required by the appropriate test data.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Intumescent coatings:
- .1 Material or combination of fireproofing materials used to help retain the structural integrity of steel members by maintaining an effective thermal barrier to provide fire resistance rating as documented by listings from accredited test laboratories.

.2 Fire retardant coating applied directly to exposed primary and secondary structural steel framing members where shown on the Drawings or required by Building Code.
- .1 This applies to structural steel columns in General Purpose Room 124, except where specifically exempted under the provisions of the Ontario Building Code.

.3 Provide fire-resistant coatings in accordance with approved ULC or cUL design numbers, providing minimum 1 hour fire resistance.

.4 Submit details of proposed tested assemblies to Consultant for approval before proceeding. Refer to manufacturer's product data sheets for ULC and cUL tested design numbers.

.5 Upon completion of the application the Contractor must submit a certificate stating what system of fireproofing material was applied and that it complies with the fire protection requirements.

1.2 RELATED WORK

.1	Concrete Block work	Section 04 22 00
.2	Cementitious Fireproofing	Section 07 81 16
.3	Painting	Section 09 90 00

1.3 REFERENCES

.1 Underwriters Laboratories of Canada:

.1	CAN/ULC-S101	Standard Methods of Fire Endurance Tests of Building Construction and Materials
.2	CAN/ULC-S102	Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
.3	CDWZ7-ULC	Guide Info, Mastic and Intumescent Coatings Certified for Canada
.4	CAVCC-ULC	Guide Info, Intumescent Coatings, Thin-Film
.5	BXUVC-ULC	Guide Info Fire-resistance Ratings

.2 UL:

.1	CDWZ7-UL	Guide Info, Mastic and Intumescent Coatings Certified for Canada
.2	BXRH7-UL	Guide Info, Fire-resistance Ratings Certified for Canada
.3	ANSI/UL263	Standard for Fire Tests of Building Construction and Materials

.3 ASTM International:

.1	ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials
.2	ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials

.3 ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection and Testing
.4 ASTM D2240 Standard Test Method for Rubber Property—Durometer Hardness
.5 ASTM D2794 Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
.6 ASTM D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
.7 ASTM D4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

.4 The Association of the Wall and Ceiling Industry (AWCI):
.1 Technical Manual 12-B Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide - 117

1.4 QUALIFICATIONS

.1 Manufacturer Qualifications:
.1 Company responsible for the manufacture of fire protection materials with local direct technical employees readily available at the Project site.
.2 Intumescent coatings shall be manufactured under the Follow-up Services program of Underwriter's Laboratories (UL) or UL Canada (ULC) and bear the UL (and/or ULC) label (mark).
.3 Manufacturer's technical representative to be on site during start of installation and be generally available on site as requested during the application process.

.2 Installer Qualifications:
.1 Experienced Installer certified, licensed, or otherwise qualified by the intumescent coatings manufacturer as having the necessary training to install manufacturer's products, who shall have the experience and staff to properly perform the installation.
.2 Installer shall be trained by the intumescent coatings manufacturer's direct employees.

.3 Installation:
.1 Verify steel members have been properly prepared, including the use of a compatible primer, and install intumescent coatings in accordance with manufacturer's written recommendations published in their product technical literature and/or provided by manufacturer.

.4 Field Constructed Mockups:
.1 Prior to installing intumescent coatings, Installer shall apply products specified for exposed applications to demonstrate aesthetic qualities and workmanship. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
.1 Extent of Mockups: Approximately 5 sq. ft. of surface for each product indicated.
.2 Notify Consultant one week in advance of the dates and times when mockups will be built.
.3 Obtain Consultant written acceptance of mockups before start of actual unit of Work.
.4 Retain and maintain mockups during construction in undisturbed condition as a standard for judging completed units of Work.

1.5 SUBMITTALS

.1 Submit a letter from the manufacturer confirming that the installer has been instructed in the application of the products specified below and is approved for this work.

.2 Submit manufacturer's confirmation that the material will provide the required 1 hour fire rating, including relevant Canadian test results and design information, as required for approvals by local Authorities Having Jurisdiction.

.3 Submit two 600 x 600mm colour samples of top coat material, in colour selected by Consultant.

1.6 **PRODUCT DELIVERY, STORAGE AND HANDLING**

.1 Deliver and store materials in original containers with manufacturer's labels and seals intact, stored off the ground in a dry lockable area, with temperature above 0°C and below 38°C, until surfaces are ready for application.

.2 Refer to manufacturer's instructions for storage and handling, including environmental requirements.

1.7 **PROTECTION**

.1 Obtain complete information on health and safety precautions from manufacturer and follow such precautions, in compliance with local health, safety and environmental regulations and standards.

.2 Mask the spray area as required to protect adjacent areas from over-spray. Provide rip-proof plastic tarps for protection of adjacent surfaces. Mask to provide neat, clean, true juncture lines with no marring of adjacent surfaces.

1.8 **WARRANTY**

.1 Provide written warranty stating that fire retardant coatings shall remain free from defects of workmanship and materials in accordance with the General Conditions but for a period of **three (3) years** and including replacement or repair of all faulty materials or work without cost to the Owner. Crazing, blistering, fading, bond failure and softening shall be considered defects.

1.9 **INSPECTION AND TESTING**

.1 An independent inspection and testing agency will be appointed by the Owner to perform field quality control testing services in accordance with AWCI Technical Manual 12-B, Ontario Building Code, and requirements of Authorities Having Jurisdiction.

.2 The cost of inspection and testing will be paid by the Contractor through the Cash Allowance included in the Contract.

.3 Remove and replace any intumescent coatings where test results indicate that fireproofing does not comply with specified requirements for adhesion.

.4 Apply additional intumescent coatings per manufacturer's directions where test results indicate that the thickness does not comply with specified requirements.

.5 Additional Testing:
- .1 Where intumescent coatings are removed and replaced or repaired, Inspection and Testing agency shall perform additional testing to determine compliance with specified requirements.
- .2 The cost of additional testing required due to Contractor's failure to meet minimum standards will be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Intumescent coatings:
- .1 Factory mixed formulation consisting of a modified heavy bodied coating, water based, with inorganic reinforcing fibres (non-asbestos, non-fibreglass) for spray application.
- .2 Hilti Fire Finish CFP-SP WB by Hilti, Inc.

.2 Physical Characteristics:

- .1 Surface Burning Characteristics of Building Materials, ASTM E 84 (UL 723, CAN/ULC-S102): Class A Rating.
  - .1 Flame Spread: 0
  - .2 Smoke Development 45
- .2 Durometer Hardness, ASTM D2240: 96 Shore A
- .3 Impact Resistance, ASTM D2794: 93 in lb
- .4 Abrasion Resistance, ASTM D4060: 0.140 g/1000 cycles
- .5 Adhesion, ASTM D4541: 507 psi

.3 Auxiliary Fireproofing Materials:

- .1 Substrate Primers:
  - .1 For use on each different substrate, provide primer approved in writing by manufacturer of intumescent coatings, and applied in full compliance with the primer manufacturer's recommendations.
  - .2 Primer must be fully cured prior to installation of the intumescent coating.

- .2 Topcoats:
  - .1 Suitable for application over applied intumescent coatings; of type recommended in writing by intumescent coatings manufacturer for each fire resistance design.
  - .2 Colour of topcoat shall be as selected by the Consultant. Colours shall not be limited to the manufacturer's standard colours.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Inspect surfaces to receive fire retardant coating and advise Consultant if any conditions may interfere with the successful application of coating to achieve both the required fire resistance rating and a quality finish appearance.

.2 Proceed with application only if the air and surface temperature is greater than 10°C but less than 35°C. Relative humidity in work area to be between 40 - 60%. Work shall not be exposed to weather during or after installation.

.3 Proceed with exterior applications only if the air and surface temperature is greater than 10°C but less than 35°C and minimum 3°C above dew point. Relative humidity may not exceed 80%.

.4 Apply coatings before adjacent work is painted.

.5 Do not apply coating over non-hardening sealants or caulking materials.

.6 Apply all coatings in strict accordance with manufacturer's instructions, and in accordance with the following tested assemblies:
- .1 BXUV.D990 for concrete and steel floor units
- .2 BXUV.N640 for beams
- .3 BXUV.Y633 for wide flange steel columns
- .4 BXUV.Y634 for hollow section columns

.7 Apply approved primer over prepared substrate at rate recommended by the manufacturer. Galvanized steel shall be prepared in accordance with the surface preparation guidelines in the Architectural Painting Specification Manual published by the Master Painters Institute (MPI), and as acceptable to the manufacturer of the primer.
- .1 For exterior applications, supply primer to structural steel fabricator for prime painting of exposed exterior steel columns, and the underside of the associated beams, in the shop. Provide complete, printed instructions for preparation of steel, application of product (over zinc-rich primer), and handling after application. Touch up primer on site, as required, after installation of structural steel.

.8 Over primer, spray apply fire retardant coating in accordance with manufacturer’s directions, and as required to achieve the 1 hour fire resistance rating. Refer to manufacturer’s fire test design information to determine the minimum dry film thickness required for the size and orientation of the steel member to be protected.

.9 Apply fire retardant coating using application rate and number of coats recommended by the manufacturer for the site conditions and the total thickness required.

.10 Do not apply top coat until the Inspection and Testing Company has confirmed that the required dry film thickness of the fire retardant coating has been provided. Additionally, fire retardant coating must be fully dry before application of top coat.

.11 Apply top coat in two coats, by brush or roller, in colours selected by the Consultant. Finish shall match approved sample in colour saturation; provide an additional coat if required to match sample.

.12 Finished work shall be even, uniform in colour and appearance, free from marks, runs, craters or other defects detrimental to appearance or performance.

.13 Seal around all fixtures and fittings protruding through coating.

.14 Upon completion remove masking and clean over-spray from adjacent surfaces.

3.2 **FIELD QUALITY CONTROL**

.1 Take frequent measurements as the work progresses to verify installed material thickness. Use a wet film gauge approved by material manufacturer.

.2 Apply additional coats of fire retardant material where measurements indicate thicknesses less than required by the appropriate test data.

.3 Coordinate installation of fireproofing with Owner's independent Inspection and Testing agency.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.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 **Assume existing firestopping and smoke seals at existing Kindergarten Rooms 115, 120, 121, 135 and Classrooms 114-1, 114-2, 114-3 are compromised. Provide new fire stopping and smoke seal at existing separations between Classrooms and between Classrooms and Corridors. Refer to Section 01 82 19 - Fire Rating and Assemblies for scope.**

.7 Provide all labour, materials, products, equipment and services, to supply and install the firestopping and smoke seal work for the entire project, including at the following locations:

.1 Openings in fire rated walls and roofs both empty and those containing penetrating items.
.2 Gaps located within expansion joints.
.3 Gaps between the tops of fire rated walls and underside of fire rated roof assemblies.
.4 Penetrations through construction enclosing compartmentalized concealed areas (fire blocks), involving both empty openings and openings containing penetrating items.
.5 Penetrations through smoke barriers, including 0-hour rated fire separations.

.8 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 entire building. 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 Walls:
.1 Non-rated openings through walls shall be sealed under applicable architectural, mechanical, and electrical specification sections.

.3 Metal sleeves for fire rated openings through walls shall be 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	Fire rating and Assemblies	Section 01 82 19
.2	Demolition and Alterations	Section 02 40 00
.3	Concrete Unit Masonry	Section 04 22 00
.4	Joint Sealants	Section 07 92 00
.5	Expansion Control	Section 07 95 00
.6	Aluminum Windows	Section 08 51 13
.7	Gypsum Board	Section 09 29 00
.8	Mechanical work requiring firestopping	Divisions 21 - 25
.9	Electrical work requiring firestopping	Divisions 26 - 29

1.4 **REFERENCE STANDARDS/DOCUMENTS**

.1 Underwriters Laboratories of Canada (ULC):

.1	ULC	List of Equipment and Materials, Firestop Systems and Components
.2	CAN/ULC-S101	Standard Methods of Fire Endurance Tests of Building Construction and Materials
.3	CAN/ULC-S115	Standard Method of Fire Tests of Firestop Systems

.2 Underwriters Laboratories, Inc. (UL):

.1	UL	Fire Resistance Directory
	.1	Firestop Devices Certified for Canada
.2	ANSI/UL 263	Fire Resistance Ratings
.3	UL 2079	Tests for Fire Resistance of Building Joint Systems
.4	UL 1479	Fire Tests Of Through-Penetration Firestops

.3 Intertek — WH Mark Product Directory

.4 American Society for Testing and Materials (ASTM):

.1	ASTM E1966	Standard Test Method for Fire-Resistive Joint Systems
.2	ASTM E814	Test Method of Fire Tests of Penetration Firestop Systems
.3	ASTM E 2174	Standard Practice for On-Site Inspection of Installed Firestops
.4	ASTM E 2393	Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
.5	ASTM E 1399	Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Width of Architectural Joint Systems
.6	ASTM D6904	Standard Practice for Resistance to Wind-Driven Rain
.7	ASTM C 679	Standard Test Method for Tack-Free Time of Elastomeric Sealants

.5 Factory Mutual Approval Guide

.6 International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

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
.2 temporary forming materials
.3 substrate primers
.4 collars
.5 steel sleeves

.5 Provide round fire-rated cable management device whenever cables penetrate fire rated walls, where frequent cable changes and additions may occur

.6 Provide products that upon curing, do not re-emulsify, dissolve, leach, 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.

.7 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.

.8 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.

.9 Openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.

.10 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.

.11 Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.

.12 Provide through penetration firestop systems and fire-resistive joint systems subjected to an air leakage test conducted in accordance with Standards UL1479 and UL2079, 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.

.1 L-Rating shall not exceed 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

.13 Testing agency shall be accredited by Standards Council of Canada and approved to perform fire endurance testing as outlined in this section of Work, which includes the following agencies;
- .1 Underwriters Laboratories (Canada). ULC mark.
- .2 Underwriters Laboratories, approved for Canada; cUL mark.
- .3 Intertek Testing Service NA Ltd. (formerly Warnock Hersey); WH mark

.14 Mould Resistance:
- .1 Provide penetration firestopping with mould and mildew resistance rating of 0 as determined by ASTM G21.

.15 Rain and water resistance:
- .1 Provide perimeter joint sealant tested in accordance with ASTM D 6904 with less than one hour tack free time as tested in accordance with ASTM C 679.

1.6 SUBMITTALS

.1 Manufacturer's Data:
- .1 Provide submittals in accordance with Section 01 33 23.
- .2 Submit all ULC, cUL, or Intertek/WH tested systems or designs proposed for use on the project. Submissions must be in compliance with the requirements of the Contract Documents and certified for use in Canada.
- .3 Submit manufacturer's specifications, installation instructions and product data for each material to be used. Materials must be as listed on the submitted tested system documents.
- .4 Submit MSDS for all materials.

.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 under Part 2, below.

.2 Installer Qualifications:

.1 The work is to be installed by a Subcontractor with at least one of the following qualifications:
- .1 FM 4991 Approved Contractor
- .2 UL Approved Contractor
- .3 Hilti Accredited Fire Stop Specialty Contractor
- .4 five (5) years continuous experience with firestopping installation.

.2 Installer shall be certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to install manufacture's products per specified requirements.

.1 A supplier's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer.

.3 Arrange for manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train firestop Subcontractor's personnel in proper system selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

.4 Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

.5 Where no ULC or cUL tested firestop system is available through a manufacturer for a specific application, request a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests and submit to local Authorities Having Jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

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, UL 1479, and CAN/ULC-S115 to achieve the required fire protection ratings.

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. Do not accept or use damaged or expired 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.

.6 Firestopping devices and materials are either cast-in-place (integral with concrete placement), built-in, or post-installed. Provide cast-in-place and built-in firestop devices prior to concrete placement.

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 Hilti (Canada) Corporation
- .2 A/D Fire Protection Systems Inc.
- .3 Tremco Fire Protection Systems Group
- .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, and UL 1479 or UL 2079, and listed by ULC, cUL, or Intertek (WH), and approved by jurisdictional authorities and the Consultant.
- .2 Comply with Ontario Building Code requirements for locations and ratings.

.2 Materials and devices specified below are as manufactured by Hilti. Equivalent products manufactured by one of the approved manufacturers listed above will be accepted based on acceptance of the tested assemblies of which they are part.

.3 Pre-installed firestop devices for use with non-combustible and combustible pipes (closed and open systems), conduit and/or cable bundles penetrating concrete floors and/or gypsum walls:
- .1 Hilti Cast-In Place Firestop Device (CP 680-P)
- .2 Hilti Tub Box Kit (CP 681) for use with tub installations.
- .3 Hilti Cast-In Place Firestop Device (CP 680-PX) for use with XFR pipe
- .4 Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
- .5 Hilti Speed Sleeve (CP 653) for use with cable penetrations.
- .6 Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
- .7 Hilti Firestop Block (CFS-BL)

.4 Sealants or caulking materials for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT):
- .1 Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- .2 Hilti Fire Foam (CP 620)
- .3 Hilti Flexible Firestop Sealant (CP 606)
- .4 Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
- .5 Hilti Firestop Silicone Sealant Self Levelling (CFS-S SIL SL)

.5 Sealants or caulking materials for use with sheet metal ducts:
- .1 Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
- .2 Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
- .3 Hilti Flexible Firestop Sealant (CP 606)
- .4 Hilti Intumescent Firestop Sealant (FS-ONE MAX)

.6 Sealants, sprays, or pre-formed materials for use with fire-rated construction joints and other gaps:
- .1 Hilti Firestop Top Track Seal (CFS-TTS)
- .2 Hilti Firestop Joint Spray (CFS-SP WB)
- .3 Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
- .4 Hilti Flexible Firestop Sealant (CP 606)
- .5 Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
- .6 Hilti Firestop Silicone Sealant Self Levelling (CFS-S SIL SL)
- .7 Hilti bottom of wall sealant CP 605

.7 Pre-formed mineral wool designed to fit flutes of metal profile deck; as a backer for spray material:
- .1 Hilti Speed Plugs (CP 777)
- .2 Hilti Speed Strips (CP 767)

.8 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe:
- .1 Hilti Intumescent Firestop Sealant (FS-ONE MAX)

.9 Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles:
- .1 Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- .2 Hilti Fire Foam (CP 620)
- .3 Hilti Flexible Firestop Sealant (CP 606)
- .4 Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
- .5 Hilti Firestop Silicone Sealant Self Levelling (CFS-S SIL SL)

.10 Non curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles:
- .1 Hilti Firestop Putty Stick (CP 618)
- .2 Hilti Firestop Plug (CFS-PL)

.11 Wall opening protective materials for use with cUL. / ULC listed metallic and specified nonmetallic outlet boxes:
- .1 Hilti Firestop Putty Pad (CFS-P PA)
- .2 Hilti Firestop Putty Pad (CP 617)
- .3 Hilti Firestop Box Insert

.12 Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems) tested to 50 Pa. differential:
- .1 Hilti Firestop Collar (CP 643N)
- .2 Hilti Firestop Collar (CP 644)
- .3 Hilti Wrap Strips (CP 648E/648S)

.13 Materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways:
- .1 Hilti Firestop Mortar (CP 637)
- .2 Hilti Firestop Block (CFS-BL)
- .3 Hilti Fire Foam (CP 620)
- .4 Hilti Firestop Board (CP 675T)

.14 Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways:
- .1 Hilti Firestop Block (CFS-BL)
- .2 Hilti Firestop Board (CP 675T)

.15 Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls:
- .1 Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane
- .2 Hilti Firestop Cable Collar (CFS-CC)
- .3 Hilti Firestop Sleeve (CFS-SL SK)
- .4 Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
- .5 Hilti Gangplate (CFS-SL GP) for use with multiple cable management devices.
- .6 Hilti Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.
- .7 Provide round fire-rated cable management devices wherever telephone or data cables penetrate fire rated walls, which will permit frequent cable changes and additions.

.16 Sealants or caulking materials used for openings between structurally separate sections of wall and floors:
- .1 Hilti Firestop Joint Spray (CFS-SP WB)
- .2 Hilti Flexible Firestop Sealant (CP 60)

.17 Additional Materials:
- .1 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.

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 Install firestopping products in conformance with the ULC, cUL, or Intertek/WH tested assemblies reviewed by the Consultant and approved by Authorities having Jurisdiction for the specific opening type and conditions.

.2 Apply products in accordance with the manufacturer's instructions.

.1 Consult with the manufacturer's technical representative to determine proper procedure for conditions not fully covered by printed instructions.

.2 Record in writing any oral instructions received, with copy to manufacturer.

.3 Firestopping for vertical applications:

.1 Use systems incorporating non-sag caulk or spray grade sealants, Mortar, Collars or Pillows.

.2 Use manufacturer's sleeves

.3 Provide round fire-rated cable management device where cables penetrate fire rated walls, where frequent cable changes and additions may occur.

.4 Firestopping for horizontal applications: Use systems incorporating non-sag caulk or self-levelling or spray grade sealants, Mortar, Collars or Pillows.

.5 Firestopping for overhead applications: Use systems incorporating non-sag caulk or spray grade sealants or Mortar.

.6 Install firestopping sealants with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal. Tool or trowel exposed surfaces. Remove excess sealants promptly as the Work progresses and upon completion.

.7 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.

.8 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.

.9 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.

.10 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.

.11 Mortar:
- .1 Install damming material as required.
- .2 Mix mortar in strict accordance with manufacturers 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.

.12 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.
- .4 Provide mineral wool additionally to provide acoustic separation between spaces.

.13 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 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.

.3 Leave work area and adjacent surfaces in a condition acceptable to the Consultant.

.4 Leave installed work with sufficient protection to enable it to remain untouched until project turnover.

3.6 **EXISTING BUILDING**

.1 Assume that fire separations in existing school have been compromised.

.2 Refer to Section 01 82 19 Fire Rating and Assemblies paragraph 1.2 for scope of work to be included in contract.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete Unit Masonry	Section 04 22 00
.2	Steel Deck	Section 05 30 00
.3	Plastic Laminate	Section 06 41 19
.4	Air Sealant Foam	Section 07 27 00
.5	Sheet Metal Flashing and Trim	Section 07 62 00
.6	Firestopping and Smoke Seal	Section 07 84 00
.7	Expansion Joints	Section 07 95 00
.8	Aluminum Windows	Section 08 51 13
.9	Acoustic sealant	Section 09 29 00
.10	Ceramic Tile	Section 09 30 16

1.2 REFERENCE STANDARDS

.1 ASTM International:

.1	ASTM C 510	Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
.2	ASTM C 719	Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
.3	ASTM C 794	Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
.4	ASTM C 834	Standard Specification for Latex Sealants
.5	ASTM C920	Standard Specification for Elastomeric Joint Sealants
.6	ASTM C 1087	Standard Test Method for Determining Compatibility of Liquid- Applied Sealants with Accessories Used in Structural Glazing Systems
.7	ASTM C 1193	Standard Guide for Use of Joint Sealants
.8	ASTM C 1247	Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids
.9	ASTM C 1248	Standard Test Method for Staining of Porous Substrate by Joint Sealants
.10	ASTM C 1311	Standard Specification for Solvent Release Sealants
.11	ASTM D 2203	Standard Test Method for Staining from Sealants

1.3 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.

1.4 **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 documented experience.

1.5 **SUBMITTALS**

.1 Submit samples of each sealant, in conformance with Section 01 33 23.

.2 Provide colour cards for Consultants selection.

.3 Submit written adhesion and compatibility approval from the sealant manufacturer for all materials to be sealed.

1.6 **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 weatherseal 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,
.2 Dow Corning 756 SMS, manufactured by Dow Corning Canada Inc., or
.3 Spectrem 3, manufactured by Tremco Ltd., and
.4 conforming to the product properties published.
.5 to ASTM C920 Type S, Grade NS, Class 50, Use NT, M, G, A, and O

.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.
.4 to ASTM C920 Type S, Grade NS, Class 50, Use M, G, A, and O

.3 Sealant Type C: For interior locations where conditions of high humidity exist such as washrooms. 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 One-part, moisture cure, medium modulus silicone sealant; Contractors Weatherproofing Sealant (CWS) BY Dow Corning; to ASTM C 920 Type S, Grade NS, Class 50, Use NT, M, A, O (granite).
.2 One-part, moisture-cure, low-modulus silicone sealant; Contractors Concrete Sealant by Dow Corning; to ASTM C 920 Type S, Grade NS, Class 50, Use T, NT, M, G, A, O.

.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 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 siding and metal panels and adjacent materials.

.7 Between window, louvre, and skylight 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, louvre, and skylight 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 **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.

3.4 **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.

3.5 **MASKING**

.1 Where necessary to prevent contamination of adjacent surfaces, mask the areas adjacent to the joints with masking tape.

3.6 **INSTALLATION**

.1 Install joint backing materials at all locations as detailed or where required by sealant manufacturer's printed directions.

.2 Install a bondbreaker 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.

3.7 **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

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete expansion joints	Section 03 15 00
.2	Cast-In-Place Concrete	Section 03 30 00
.3	Roof expansion joints	Section 07 71 00
.4	Firestopping	Section 07 84 00
.5	Joint Sealants	Section 07 92 00
.6	Paint	Section 09 90 00

1.2 REFERENCES

.1	CAN/ULC-S101	Fire Endurance Tests of Building Construction and Materials
.2	CAN/ULC-S115	Fire Tests of Fire stop Systems
.3	UL 2079	Tests for Fire Resistance of Building Joint Systems
.4	ASTM E1966	Standard Test Method for Fire-Resistive Joint Systems

1.3 QUALITY ASSURANCE

.1 Conform to all applicable codes and the requirements of authorities having jurisdiction.

.2 Expansion Joint Assemblies to conform to fire ratings indicated for construction assemblies into which they are to be incorporated.

1.4 SUBMITTALS

.1 Submit Shop Drawings showing extent of expansion joint assemblies. Include details showing profiles of assemblies, splice joints between sections, end conditions, anchorage, relationship to adjoining work, and finishes.

.2 Submit test reports from qualified independent testing laboratory indicating compliance of fire-rated expansion joint assemblies for all expansion joints located in fire-rated separations.

.3 Submit manufacturer's product literature and installation instructions.

.4 Submit samples of finishes for approval and colour selection.

PART 2 MATERIALS

2.1 MATERIALS

.1 Primers, coatings, sealants, and adhesives meet the VOC content requirements of section 01 67 00.

.2 Aluminum:
- .1 to ASTM B 221, alloy 6063-T6.
- .2 Finish: Clear anodized

.3 Fire Barrier: Fire barrier system with Mineral Wool and Silicone Sealant System, tested to UL2079 and CAN/ULC-S115 as required for fire resistance rating.

.4 Fasteners, accessories and other materials required for complete installation in accordance with the manufacturer's instructions.

.5 Expansion Joint Cover Assemblies shall be as manufactured by InPro Corporation, including the following types:

.1 Exterior

.1	wall/wall:	491E-A07-075
.2	corner/wall:	651-A09-025

.2 Interior

.1	floor/floor:	101-A01-025
.2	floor/wall	101-A02-025
.3	flat wall-block:	801-A07-025
.4	flat wall - drywall:	801-A07-025
.5	corner wall:	801-A09-025
.6	acoustic tile ceiling:	821-V24-025
.7	acoustic tile ceiling edge:	821-V23-025
.8	ceiling/ceiling - drywall:	811-A07-025
.9	wall/wall (uneven conditions)	811-A07-025

.6 Equivalent expansion joint cover assemblies by C/S Construction Specialties or Balco, Inc. are also acceptable, subject to conformance with these specifications.

.7 Provide fire rated expansion joints at fire rated separations. Fire rating of expansion joint assembly must be equal to the rated separation required at each location.

.8 Provide customized expansion joint cover assemblies at junctions with curved walls, and as indicated on drawings.

PART 3 - EXECUTION

3.2 PREPARATION

.1 Examine surfaces to receive Work. Do not proceed unless conditions are favourable for installation. Notify the Consultant, in writing, if defects exist which would prevent the satisfactory completion of this Work.

.2 In fire rated separations, firestopping must be completed prior to installation of expansion joint covers.

.3 Verify all dimensions on site.

.4 Provide templates to related trades for location of all support and anchorage items.

3.3 INSTALLATION

.1 Apply expansion joint assemblies in accordance with manufacturer's printed instructions.

.2 Install joint cover assemblies in true alignment and in correct relationship to expansion joints and adjacent surfaces.

.3 Provide for thermal expansion and contraction of metal.

.4 Set floor covers flush with adjacent floor finishes.

.5 Install all covers securely, in continuous contact with adjacent surfaces.

.6 Assemblies must be continuous, with mechanically aligned spliced joints. Keep end joints to a minimum.

.7 Install preformed seals in continuous lengths; minimize number of end joints. Heat seal sliced joints.

.8 Apply adhesive, as recommended by manufacturer, to both frame interfaces prior to installing seals.

3.4 PROTECTION AND CLEANING

.1 Leave peel-off protective covering in place until all Work in area is complete.

.2 Prior to occupation of the building by the Owner, remove protective coverings and clean exposed metal as per manufacturer's printed instructions.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Concrete Masonry Units	Section 04 22 00
.2	Wood Doors	Section 08 14 00
.3	Joint Sealants	Section 07 92 00
.4	Door Hardware	Section 08 71 00
.5	Glazing	Section 08 81 00
.6	Gypsum Board	Section 09 29 00
.7	Painting	Section 09 90 00
.8	Electrical	Division 26

1.2 WORK INCLUDED

.1 Supply and install all hollow metal products including doors, frames, transom frames, screens, sidelight and window assemblies with provision for glazed, panelled or louvred openings, fire labelled and non-labelled, as scheduled or shown on the Drawings.

.2 Work shall including the following:

.1 Door cutouts, complete with reinforcing, stops and closers required for glazing.

.2 Reinforcing for Finishing Hardware.

.3 Preparations for wiring for security and control systems and electronic hardware.

.4 Supply of all necessary fastening and anchoring devices for above items.

.5 Steel closure pieces at metal panels, steel columns, horizontal members, and hollow metal frames and screens. Refer to Drawings.

.6 Metal panels in hollow metal frames.

.7 Provision of zinc-rich coating on all exterior steel doors, frames and screens.

.8 Fire rated and labelled doors, frames, and screens, glazed and unglazed, where noted on schedule.

.9 Supply and install HSS and channel reinforcing members where shown at screens and door frames/sidelights.

.10 Supply and installation of transfer grilles and door louvres, where indicated on Door and Frame Schedule; fire labelled where door rating is indicated.

.11 Supply and install door silencers on metal frames.

1.3 **REFERENCES**

.1 ULC Standards:

.1	CAN/ULC-S104	Standard Method for Fire Tests of Door Assemblies
.2	CAN/ULC -S105	Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104
.3	CANULC-S106	Standard Method for Fire Tests of Window and Glass Block Assemblies

.2 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

.3 CSA Group:

.1	CSA W59	Welded Steel Construction (Metal Arc Welding)
.2	CSA S136	North American specification for the design of cold-formed steel structural members

.4 ASTM International:

.1	ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.2	ASTM A1008/1008M	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
.3	ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
.4	ASTM C553	Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
.5	ASTM C578	Specification for Rigid, Cellular Polystyrene Thermal Insulation
.6	ASTM C591	Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
.7	ASTM C665	Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
.8	ASTM C1289	Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

.5 American National Standards Institute:

.1	NFPA 80	Standard for Fire Doors and Fire Windows
.2	ANSI A250.4	Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors Frames and Frame Anchors
.3	ANSI/DHI A115.IG	Installation Guide for Doors and Hardware
.4	ANSI A250.11	Recommended Erection Instructions for Steel Frames

1.4 **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. 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 CAN/ULC-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, or exceed, standards set by the Canadian Steel Door Manufacturers Association.

1.5 **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 81 00 for fire glass specifications. No Georgian Wired 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.

1.6 **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 $8m^2$ 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.

1.7 **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.

1.8 **TESTING**

.1 Up to 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.

1.9 **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 Metal Door
- .6 Trillium Steel Doors
- .7 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, tension levelled, to ASTM A924 and ASTM A1008/1008M, suitable for forming and bending without metal or coating fracture.

.2 Steel sheet to be galvanized to ASTM A653/A653M, commercial steel
.1 Steel for doors and interior frames to be hot-dipped galvannealed; coating designation ZF120
.2 Steel for exterior frames to be hot-dipped galvanized; coating designation A275

.3 Doors, over $3m^2$: commercial quality zinc coating, comply with ASTM A1008/A1008M.

.4 Minimum Base Steel Thicknesses:

.1 Doors: 1.443mm [16ga)
.2 Panels: 1.153mm (18 ga)
.3 Frames: 1.443mm (16 ga)
.4 Hinge Reinforcement: 3.416mm (10 ga)
.5 Minimum thickness to be based on CSA-S136.

.5 Door Materials:

.1 Exterior, High Use and Oversize Doors:
.1 Includes all exterior doors,
.2 high use doors, including doors at vestibules, corridors, and washrooms
.3 all doors over $3m^2$ and over 1200mm wide or over 3000mm in length.
.4 Semi-rigid rock wool insulation in all exterior doors.
.5 Reinforce steel doors with 20 ga. vertical interlocking weld steel stiffeners at 150mm o.c., spot welded to face sheets.
.6 Doors to be Fleming H-Series, 16 gauge, with continuous welded edge seams.

.2 Other interior doors and panels up to $3m^2$ and maximum width of 1200mm or maximum length of 3000mm:
.1 Doors to be Fleming D-Series, 16 gauge, or equivalent.
.2 Interior Doors to be Honeycomb Core.

.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 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 46.
.2 Assembly includes manufacturer's proprietary door and frame construction, and acoustical gasketing system. Doors to be Fleming Whisper Core Series, 16 gauge.

.8 Honeycomb: Structural small cell (25.4 mm max) Kraft paper "Honeycomb"; weight: 36.3kg per ream minimum; density: 16.5kg/m3 minimum.

.9 Frame reinforcement:
- .1 Reinforce frames for high frequency hinge preparation.
- .2 Reinforce and provide cut outs and boxes for security devices.
- .3 Reinforce for overhead stops.
- .4 Frames at acoustic doors to be filled with mortar.

.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 other high use doors, and all doors over $3m^2$ 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 and screens 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 05, 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 high use and oversized interior doors shall have steel reinforcing.

.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, and washroom doors and all doors classified as "high use" shall be reinforced with 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.

.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 on interior side of exterior doors and screens 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.

.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 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.

.14 Mounting bars for sidelights shall be as detailed on the Drawings and shall be completely filled with glass fibre insulation.

.15 Frames at STC rated doors shall be mortar filled to meet door manufacturers requirements for the STC rating.

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

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Ultra Heavy Duty Flush Wood Interior Doors:
- .1 NAUF particleboard core for intensive use wood doors.
- .2 Finishing of interior wood doors.

.2 All materials to be without added urea formaldehyde.

1.2 RELATED WORK

.1	Concrete Masonry Units	Section 04 22 00
.2	Wood doors in casework	Section 06 41 13
.3	Steel Doors and Frames	Section 08 11 13
.4	Door Hardware	Section 08 71 00
.5	Glass and Glazing	Section 08 81 00
.6	Painting	Section 09 90 00

1.3 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC):
- .1 North American Architectural Woodwork Standards

.2 ULC
- .1 CAN/ULC-S104 Standard Method for Fire Tests of Door Assemblies
- .2 CAN/ULC-S113 Standard Specification for Wood Core Doors Meeting the Performance Required by CAN/ULC-S104 for Twenty Minute Fire Rated Closure Assemblies

1.4 QUALITY STANDARDS

.1 All Work to conform to minimum standard for Premium Grade Work as specified in the current version of the AWMAC North American Architectural Woodwork Standards manual.

1.5 SUBMITTALS

.1 Prepare and submit shop Drawings in accordance with Section 01 33 23, and show the following:

- .1 Product data sheets for each type of door and frame

- .2 Door and frame schedules.
  - .1 Provide columns for Stock Code Numbers for both doors and frames.

- .3 Materials and finishes.

- .4 Hardware preparation.

.5 Installation instructions and details
.1 Typical and special details.
.2 Frame anchorage details.
.3 Method and location of exposed fastenings.

.6 Storage and handling requirements

.7 Other pertinent information.

.8 Include confirmation that materials, including adhesives, do not contain added urea formaldehyde.

.2 Samples:
.1 Submit corner sample of wood door, 300mm x 300mm, cut away to show stile, rail, crossbanding, core, and plastic laminate face veneer, accompanied by written description.
.2 Submit wood veneer samples representing manufacturer's full range of available colours and finishes.
.1 Submit duplicate 200mm x 250 mm samples of colours selected by the Consultant.
.3 Submit duplicate 200 x 250 m samples of each colour of plastic laminate finish and pattern required.

1.6 **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. Store components off the ground and under cover in a dry, protected area.

1.7 **WARRANTY**

.1 Provide an extended warranty of **three (3) years** from date of Substantial Performance against defects of workmanship including core ghosting, warping and delamination of veneer. Work showing defects during this period shall be repaired or replaced without cost to the Owner.

.2 Warranty to include hanging and finishing of any repairs and replacements that may be necessary.

PART 2 - MATERIALS

2.1 **PRODUCTS**

.1 Provide premium grade, ultra-heavy duty, 5-ply, 45mm flush slab doors, NAUF/FSC, finished with plastic laminate veneer

.2 Typical Doors shall have particleboard core.

.3 Doors, including cores, adhesives, and finishes shall be low VOC, with no added urea-formaldehyde (NAUF), and FSC Certified Wood.

.4 Wood Doors shall be from one of the following manufacturers:
- .1 Baillargeon by Masonite Architectural
- .2 JWS Manufacturing Inc.
- .3 Lambton Doors
- .4 Marshfield Wood Doors
- .5 Mohawk by Masonite Architectural
- .6 VT Industries

.5 Provide all wood doors and frames from a single manufacturer, to ensure uniformity in quality of appearance, finish and construction.

.6 Solid Wood Doors:

.1 Stiles and rails shall be bonded to core.

.2 Stiles: 86mm wide structural composite lumber

.3 Edges: 24mm min. solid hardwood (matching edge)

.4 Rails: 86mm wide structural composite lumber
- .1 Anti-warp rail: provide central rail of 133mm wide structural composite lumber at doors wider than 914mm

.5 Core: NAUF/FSC solid mat formed particle board, density 449 - 513kg/m^3, conforming to CSA-O188. No added urea-formaldehyde resins.

.6 Adhesive: Type 1, Waterproof, no urea formaldehyde, VOC < 0.683 g/L.

.7 Face: plastic lamina as manufactured by Formica, Arborite or Pionite.

2.2 **FINISHING**

.1 Finish to be AWMAC System 9, UV Curable, Acrylated Epoxy, Polyester, or Urethane, premium grade finish.

.2 Carefully prepare all work to receive finish. Thoroughly sand all wood surfaces to remove machine marks and make dust-free before finishing.

.3 Finish all exposed surfaces with two coats of sealer, sanded smooth, and two coats of finish, applied in accordance with AWMAC standards and best practises. The resultant finish must be of highest quality for furniture use.

.4 Finish unexposed top and bottom edges with two coats of tinted sealer, colour coordinated with doors. Side edges shall be fully finished to match faces of doors.

.5 Finish shall be to approval of Consultant. Before proceeding submit prepared 300mm x 300mm finished samples of materials for approval.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Examine the work in place on which this work depends. Notify the Consultant in writing of any conditions which would affect the successful installation of the work of this Section. Commencement of installation will be taken as acceptance of existing conditions.

.2 Fit all wood doors accurately in their frames. Doors must swing easily and close tightly without movement when latched.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Glazed aluminum windows include thermally broken tubular aluminum sections with self supporting framing.

.2 All aluminum windows to be shop fabricated, factory prefinished, with glazing, spandrel infill, related flashings, anchorage and attachment devices.

.3 Sheet metal air/vapour barrier closures and finish closures, and aluminum angle closures at jambs.

.4 Insulation and air/vapour barrier seals between work of this section and adjacent construction

.5 Sealants for work of this section and between work of this section and adjacent construction

.6 System to permit replacement of individual glass and spandrel panels without necessitating removal of structural mullion sections

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Clay Unit Masonry	Section 04 21 00
.2	Concrete Unit Masonry	Section 04 22 00
.3	Insulation	Section 07 21 00
.4	Air Barriers	Section O7 27 00
.5	Sealants (other than this Section)	Section 07 92 00
.6	Door Hardware	Section 08 71 00
.7	Glazing	Section 08 81 00
.8	Window Shades	Section 12 24 00

1.3 REFERENCES

.1 AAMA/WDMA/CSA 101/I.S.2/A440 NAFS - North American Fenestration Standard/ Specification for Windows, Doors, and Skylights

.2 Canadian Standards Association (CSA):

.1	CSA A440S1	Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights
.2	CAN/CSA-A440.2/A440.3	Fenestration energy performance / User guide to CSA A440.2, Fenestration energy performance
.3	CAN/CSA A440.4	Window, Door and Skylight Installation
.4	CAN/CSA-G40.21	Structural Quality Steels
.5	CSA-S136	Cold Formed Steel Structural Members
.6	CAN/CSA-S157	Strength Design of Aluminum
.7	CSA-W59.2	Welded Aluminum Construction

.3 Canadian General Standards Board (CGSB):

.1	CAN/CGSB-12.1	Tempered or Laminated Safety Glass
.2	CAN/CGSB-12.9	Spandrel Glass
.3	CAN/CGSB-12.20	Structural Design of Glass for Buildings
.4	CAN/CGSB-19.13	Sealing Compound, One Component, Elastomeric Chemical Curing
.5	CAN/CGSB-19.24	Multi-Component, Chemical Curing Sealing Compound
.6	CAN/CGSB-51.10	Mineral Fibre Board Thermal Insulation

.4 ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings

.5 American Architectural Manufacturers Association (AAMA):

.1	AAMA-GSM-1	Metal Curtain Wall, Window, Store Front and Entrance Guide Specifications Manual

.6 ASTM International:

.1	ASTM-A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
.2	ASTM-A446	Specification for Sheet Steel, Zinc-Coated by the Hot-Dip Process, Structural Quality
.3	ASTM-B209	Specification for Aluminum and Aluminum-Alloy Sheet and Plate
.4	ASTM-B221	Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
.5	ASTM E119	Standard Test Methods for Fire Tests of Building Construction and Materials.
.6	ASTM E2010	Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.
.7	ASTM-E283	Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
.8	ASTM E 330	Test for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
.9	ASTM-E331	Test Method for Water Penetration Through Exterior Windows, Curtain Wall and Doors by Uniform Static Air Pressure Difference

.7 Do sealant work in accordance with Section 07 92 00 unless otherwise specified herein.

.8 Do glazing work in accordance with Section 08 81 00 unless otherwise specified herein.

1.4 **DESIGN**

.1 Design and fabricate windows, brackets and anchorage devices to provide:
- .1 Resistance to pressure differentials.
- .2 Adequate provisions for thermal movement without thermal fractures.
- .3 Adequate provision for live and dead loads without failure, distortion or fracture.
- .4 For differential movement of structural live load deflection.
- .5 Adequate support and anchorage of components taking into consideration all loading factors.
- .6 Conformance to Rain Screen principles including:
  - .1 Provision of gaskets, baffles, overlaps and seals as required to provide a "Rain Screen" barrier effectively to deter rain water entry into the cavities of the system.

.2 Incorporation of air seals to effectively prevent air passage from the system into the building and vice versa.

.3 Air and vapour seals required to minimize airborne vapour exfiltration from the building into the system cavities.

.4 Openings between system cavities and the outside of sufficient cross-sections to provide pressure equalization. All such openings to be effectively drained to allow moisture entering cavity to escape.

.7 For long range shrinkage (creep) of concrete structure.

.8 A continuous air seal from the non-glass wall systems air seal to the aluminum curtain wall frame and from there to the inside glass face. These seals shall be made in such a manner that with anticipated structural and thermal movement there will be no break in the seal.

.2 Clerestory windows shall comply with lateral design load of O.B.C. Division B, section 4.1.5.16.

.3 All glass in windows within 1070mm above finished floor level, at floor levels more than 600mm above adjacent grade, must be laminated safety glass. Conform to MMAH Supplementary Standard SB-13, Glass in Guards.

.4 Deflection of members when under full loads shall maintain adequate clearance of glass. Maximum deflection shall not be more than 1/175 of the span of any member.

.5 Design window systems to perform as an effective air and vapour barrier.

.6 Design windows such that glass replacement can be accomplished from the building interior.

.7 Condensation: Not more than 25mm high across the bottom of inside pane and none on aluminum frames under conditions of - 33.3 deg. C. exterior, 22.2 degrees C interior, 30% relative humidity interior 25 m/h wind measured on lee side of building, or zero condensation with no wind.

.8 Conform to Ontario MMAH Supplementary Standard SB-10 and ASHRAE 90.1.

.1 Conform to SB-10 table SB5.5-6-2017, for Climate Zone 6, as follows:

Fenestration Type	**Max. U value (W/m^2-K)**	**Max. SHGC**	**Min. VT/SHGC**
Metal framing: fixed	U-2.15	0.4	1.1
Metal framing: operable	U-2.56		

.2 Conform to ASHRAE 90.1, subsection 5.4.3.2, for fenestration and doors . When tested as indicated, air leakage shall not exceed:

.1 0.2 cfm/ft^2 when tested at a pressure of 1.57 lbs/sq.ft. in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 or NFRC 400;

.2 or 0.3 cfm/ft^2 when tested at a pressure of 6.24 lbs/sq.ft. in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

.3 Label windows in accordance with ASHRAE 90.1 requirements for "Labeling of Fenestration Products" and "Labeling of Doors". If the units do not have permanent labels, the Subcontractor shall provide a signed and dated certificate for the windows [and doors] listing the U-value, solar heat gain coefficient, and air leakage rate of the installed products.

.9 Conform to AAMA/WDMA/CSA 101/I.S.2/A440, Performance Class AW, for institutional application. The following minimum performance levels shall also be met:

	Operating Vents	Fixed Sash
Air tightness	A3	0.2 L/(s•m^2)
Water tightness	B5	B7
Wind resistence	C4	C4

1.5 **QUALITY ASSURANCE**

.1 Window Subcontractor must have ten years experience in the installation of aluminum windows and doors of the type specified, in installations of similar scope, and be approved by the window manufacturer for this installation.

.2 Installers must provide references for approval by Owner and Consultant prior to Contract award.

.3 Window manufacturer to provide letter certifying that they are supplying fully assembled window units to the Subcontractor. Assembly of aluminum sections by Subtrades is not permitted.

1.6 **SUBMITTALS**

.1 Shop Drawings

.1 Submit Shop Drawings in accordance with Section 01 33 23. Shop drawings shall be prepared by the window manufacturer, and shall be accompanied by a letter certifying that fully assembled windows are being supplied to the installer.

.2 Show detailed assembly, including large scale details of members and materials, of brackets and anchorage devices and of connection and jointing details; full dimensioned layouts for positioning of brackets and anchorage devices to structures; dimensions, gauges, thicknesses; glazing details, description of materials including catalogue numbers, products and manufacturer's names; aluminum alloy and temper designations, finish specifications and all other pertinent data.

.3 Shop drawing submission shall include information on power operating system.

.2 Submit certification of the U-value, solar heat gain coefficient, and air leakage rates for the windows and doors, in accordance with ASHRAE 90.1 and as specified above. This is not required if the windows and doors will have permanent labels indicating these values; indicate on shop drawings if units will bear permanent label.

.3 Submit test data windows being proposed, prepared by an approved testing laboratory. The window unit described herein shall meet the local requirements for operating vents and fixed framing in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

.4 Submit a written adhesion and compatibility approved from sealant manufacturer stating all materials in contact with sealants are compatible.

.5 Submit samples of glass products in accordance with Section 08 81 00.

.6 Submit one representative sample window concurrent with Shop Drawing submittal.
.1 Show frame, sash, sill, glazing and waterproofing method, insect screens, surface finish and hardware. Include 150 mm. long samples of head, jamb, sill, meeting rail, mullions to indicate profile.

.7 Provide copies of manufacturers printed maintenance instructions in Maintenance Manuals; refer to Section 01 78 00.

1.7 **DELIVERY AND STORAGE**

.1 Adequately protect glazing, aluminum and aluminum finishes to prevent damage thereto during fabrication, storage, shipping, handling and installation.

.2 Deliver, handle and store units by methods approved by manufacturer. Protect from damage and staining.

.3 Protect glass, sills and stools after installation with boards, heavy paper or other suitable protection, secured in place, to prevent staining or scratching. Do not remove protection until final cleaning.

1.8 **COORDINATION WITH OTHER TRADES**

.1 Coordinate delivery and installation of windows to occur prior to installation of exterior masonry, to permit sealing of window perimeter with air/vapour barrier membrane. Refer to drawing details.

.2 Provide protection of installed windows to prevent breaking of glass during installation of masonry, and other work.

1.9 **INSPECTION AND TESTING**

.1 An independent Testing Company will be appointed by the Consultant to test windows for conformance to these specifications. Pay for testing from the Cash Allowance specified in Section 01 10 00.

.2 Testing of two window locations with one re-test on each window is included in the Allowance. Perform any further re-tests of failed windows at no cost to Owner.

.3 Window manufacturer shall repair or replace window units not meeting specified performance requirements and the cost of re-testing an equal quantity of windows shall be borne by the window manufacturer.

1.10 **WARRANTY**

.1 Warranty the Work of this Section for a period of **five (5) years** from date of Substantial Performance, in writing. Warranty shall include all products and work to repair or replace defective units.

.2 Provide an extended warranty to **ten (10) years** against water leakage.

.3 In addition to the above, insulating glass units shall carry manufacturer's warranty of **ten (10) years** from date of Substantial Performance of the Work.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

.1 Aluminum windows specified below are as manufactured by Oldcastle Building Envelope. Products conforming to these specifications as manufactured by Aerloc Industies Ltd., Kawneer Company Inc., Alwind Industries Ltd., Windspec Inc., Commdoor Aluminum, Sherwood Windows Ltd., and Alumicor Ltd. will also be accepted.

.2 Manufacturer shall supply assembled windows to window Subcontractor.

.3 The window Subcontractor must warrant the supply and installation of all Work of this Section.

2.2 **MATERIALS**

.1 Aluminum Extrusions: Extruded shapes, Aluminum Association alloy AA 6063 T54,mechanically straightened and free of marks, of size and shape specified and detailed, minimum 2.0mm thick.

.2 Sheet and Plate Aluminum: ASTM B209, alloy 5005-H16, anodizing quality.

.3 Finish: Clear anodized finish to Consultant's approval.

.4 Structural Aluminum: for internal reinforcing; to ASTM B308

.5 Steel Sections and Plates: to CSA G4O.21 Type 300W. Hot dip galvanized with minimum zinc coating of 600g/m^2.

.6 Steel Reinforcing for screens: to CSA G40.20, Class H

.7 Thermal Break: Rigid PVC or hard rubber.

.8 Bolts, Screws, Fasteners: Hot dipped galvanized, or cadmium plated steel or 302 stainless steel.

.9 Glass: As specified in Section 08 81 00.
- .1 Provide double-glazed units for all exterior glazing.
- .2 Use fire resistant glass in fire rated assemblies.
- .3 Use tempered and laminated glass where specified or indicated on schedules.

.10 Glazing Sealant: One component silicone; Spectrum 2 by Tremco.

.11 BES Sealant: Building Envelope System sealant HE925 BES Sealant by Henry Company; one-part, medium modulus sealant, low odour, moisture cure product, weathering resistant, for sealing of wall/window penetrations. Sealant must be fully compatible with air/vapour barrier membrane. Colour to be as selected by the Consultant.

.12 Expanding Foam Sealant: refer to Section 07 27 00.

.13 Setting Blocks: Neoprene 100mm long, 80A durometer.

.14 Steel: Brake formed, galvanized sheet steel.

.15 Glazing Tape: Vulcanized butyl tape with continuous neoprene spacer. Colour as selected by Consultant.

.16 Insect Screens: aluminum mesh screens with aluminum frames to match windows.

.17 Aluminum Closures: Closures, caps, flashings, panels as detailed, from 2mm aluminum to match frame.

.18 Condensation Gutters: Supply and install formed aluminum condensation gutter at clerestory window sill, 110x25mm deep.

2.3 FABRICATION

.1 Typical aluminum windows shall be Oldcastle Series 1200 thermally broken, rainscreen windows, 25mm x 152mm.

.2 Framing shall consist of closed tubular aluminum sections, reinforced as necessary, thermally broken. Open channel profiles are not acceptable.

.3 Make profiles of framing members as shown on Drawings. All perimeter frames shall be fully closed sections, including at corners.

.4 Operating vents:

.1 Opening units to be 2000 Arctic Series Projected Window, outward opening; and top hung vents, as indicated on drawings.

.2 Equip each top-hung vent with minimum two (2) heavy duty extruded hinges with stainless steel pins, (minimum 3 hinges if vent is more than 750mm wide) with scissors arm operator with high pressure die cast zinc case and solid white bronze roto operator.

.3 Cut vent corner joint at 45 degrees and swage with 3 heavy duty reinforcing angles per corner. Screwed corners on vents will not be accepted.

.4 Provide opening limit stops. Limit opening distance generally to 150mm; confirm with Consultant.

.5 Provide aluminum insect screens at all operable vents.

.5 Entire assembly shall be weathertight throughout.

.6 Fabricate complete units in shop to provide minimum tolerance and hairline joints throughout.

.7 Assemble members by stainless steel screws. All connections shall be internally sealed in factory with approved sealing compound. Exposed frame sealants are not acceptable.

.8 Aluminum extrusions shall be designed to provide sufficient section modules to safely resist imposed loads but minimum thickness of any part of the load bearing extrusion shall be 3mm. Glazing stops may be 1.6mm. Be prepared to submit design data as requested by Consultant.

.9 Conceal interconnecting members and fasteners in completed assembly.

.10 Do not place manufacturer's name plates, labels or any other finished means of identification on exposed or finished parts.

.11 Provide weep holes in tubular members to drain condensation.

.12 Provide an extruded rigid thermal break integrated with the inner and outer aluminum extrusions to form a rigidly interconnected assembly without the use of fasteners or other thermal bridging elements.

.13 Glass stops shall provide edge margins recommended by glass manufacturer.

.14 Paint all metal surfaces in contact with concrete or masonry, plaster, mortar or dissimilar metals with protective lacquer or bituminous coating.

.15 Mitre and full strength vulcanize joints in weatherstripping.

.16 Provide 3.2mm extruded aluminum sills as indicated and to suit wall conditions, complete with chair type anchoring devices at 600mm. o.c. maximum and drip deflectors at sill ends and abutting vertical surfaces.

.17 Stools, cap flashings, closures, covers and trim shall be minimum 3mm thick aluminum, extruded or formed to profiles shown.

2.4 **GLAZING**

.1 Glaze windows in shop.

.2 Clean aluminum and glass surfaces that are to receive glazing materials with an oil removing solvent and wipe dry.

.3 Glaze windows with factory glazed wrap around vinyl glazing channels.

.4 Place setting blocks at quarter points for each light of glass.

.5 Comply with tape manufacturer's recommendations regarding use of spacers for certain glass sizes.

.6 Install glass with clean cut edges, leaving spaces for expansion and contraction between edge of glass and inside of frame as recommended by glass manufacturer.

.7 Glaze windows with sealed double glazed units.

.8 Glaze all fire rated frames with specified fire rated glass, in accordance with tested assembly.

.9 Finish tape and glazing wedge with straight unwaving sight lines.

.10 Conform to sealant manufacturer's written recommendations for cleaning, priming, backing and joint design to suit type and location of joint and environmental conditions. Conform to Section 07 92 00.

.11 Apply heel of sealant at perimeter of glass. Ensure drainage space below exterior pane to weep holes in frame and install heel bead at inner pane.

.12 Apply sealant in such a manner as to assure good adhesion to sides of joints and to completely fill voids in joint. Form surfaces of sealant smooth, concave, free from ridges, wrinkles, sags, air pockets and imbedded impurities.

.13 Glazing shall be completely weathertight.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Confirm that existing conditions are satisfactory before commencing installation. Check structural elements and adjoining work on which this work may depend. Verify dimensions of openings and minimum clearances. Verify that openings are level and plumb.

.2 Coordinate with forces installing air/vapour barrier system. Windows are to be installed in advance of the air/vapour barrier, which is to be sealed to the window frames. Where delivery of windows is late and air/vapour barrier has been installed first, protect unsecured pieces of the membrane that have been provided for application to window frames.

.3 Commencement of installation will signify acceptance of existing conditions. No extras will be considered due to subsequent problems related to unsatisfactory conditions of openings and surfaces.

3.2 INSTALLATION

.1 Provide all fastenings or anchors required to be built in under work of other Sections.

.2 Use only concealed fastenings.

.3 Securely install components so that they line up square in true, straight flat and/or flush planes, plumb and level, free from distortion.

.4 Make joints neat and fine as practicable. Allow for full expansion and contraction and take into consideration climatic conditions prevailing at time of installation.

.5 Fasten galvanized steel supports and clips with galvanized bolts and fasten aluminum members with stainless steel screws and bolts.

.6 Ensure that corner joints of frames are weathertight.

.7 Fill all voids between windows and rough opening with expanding foam insulating sealant.

.8 Remove masking tape, soils and sealant which may have been deposited on surfaces near joints.

.9 Seal all window frames to adjacent materials both sides after filling all voids with expanding foam insulation, using silicone sealant as specified above.

.10 Provide for continuity of air/vapour barrier seal, air/vapour barrier which is to be sealed to the window frames.

.11 Install metal sills straight and plumb, with uniform drainage away from building. Use maximum lengths possible. Secure sills in place with anchoring devices located at ends and at 600mm o.c.

.12 Install drip deflectors at window sills tight to face of masonry, with self tapping stainless steel screws. File all sharp edges to smooth, rounded finish.

3.3 CLEANING AND PROTECTION

.1 After installation, remove all sealants and other misplaced materials from all surfaces, including adjacent work.

.2 Thoroughly clean window frames, casings, and glass using materials and methods recommended by the window and glass manufacturer.

.3 Protect installed products until completion of project.

.4 Touch-up, repair or replace any damaged products before Consultant's review for Substantial Performance.

.5 Immediately prior to building occupancy, when directed, inspect work and remove protective wrappings, coatings and devices and clean glass and aluminum surfaces. Use methods which will not scratch or damage glass, paint or coatings.

.6 Perform final cleaning as per Section 01 74 00.

3.4 DEMONSTRATION AND TRAINING

.1 Train Owner's staff in the operation and maintenance of the power window operating system.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry	Section 06 10 00
.2	Built-Up Bituminous Roofing	Section 07 51 00
.3	Gypsum Board	Section 09 29 00
.4	Acoustic Ceilings	Section 09 51 00
.5	Electrical	Division 26

1.2 SCOPE OF WORK

.1 Supply and install tubular skylights where indicated on drawings. These may also be referred to as tunnel skylights or tubular daylighting devices.

.2 Tubular skylights shall consist of round, acrylic dome skylight with raised sill and prefabricated roof curb flashing, rigid highly reflective tunnel with flexible angled adapters, interior ceiling adapter assembly for transition from round tunnel to acoustic ceiling grid, and Fresnel diffuser; configuration as indicated on the drawings.

.3 Supply and install steel hanger rods from structure to tunnel to support it rigidly in position.

.4 All materials as required for complete and weatherproof installation, to meet details and design intent as indicated on drawings.

.5 Coordinate with electrical subcontractor for type and placement of electrical services. All low voltage wiring to be by skylight subcontractor

1.3 REFERENCE STANDARDS

.1 AAMA/WDMA/CSA101/I.S.2/A440 NAFS - North American Fenestration Standard/ Specification for Windows, Doors, and Skylights

.2 CSA A440S1 Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

.3 ANSI/ASTM Standards:

.1	D 635	Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
.2	D 1929	Standard Test Method for Determining Ignition Temperature of Plastics.
.3	E 84	Standard Test Method for Surface Burning Characteristics of Building Materials.
.4	E 330	Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
.5	547	Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

1.4 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 01 33 23.

.2 Shop drawings shall show detailed skylight assembly, including:

.1 rough opening and finished framing dimensions
.2 large scale details of members and materials, of brackets and anchorage devices and of connection and jointing details;
.3 full dimensioned layouts for positioning of brackets and anchorage devices to structure; dimensions, gauges, thicknesses;
.4 glazing details, description of materials including catalogue numbers, products and manufacturer's names;
.5 aluminum alloy and temper designations, finish specifications and all other pertinent data.
.6 all affected related work, and installation requirements.

.3 Submit manufacturer's data sheets, including:
.1 Preparation instructions and recommendations.
.2 Storage and handling requirements and recommendations.
.3 Installation instructions.

.4 Submit a written adhesion and compatibility approved from sealant manufacturer stating all materials in contact with sealants are compatible.

.5 Provide copies of manufacturers printed maintenance instructions in Maintenance Manuals; refer to Section 01 78 00.

1.5 **QUALITY ASSURANCE**

.1 Tunnel skylights shall be installed by an experienced installer approved by the product manufacturer. Provide confirmation letter from manufacturer, if requested by Consultant.

1.6 **DELIVERY AND STORAGE**

.1 Deliver, handle and store skylight by methods approved by manufacturer. Adequately protect aluminum and aluminum finishes to prevent damage during fabrication, storage, shipping, handling and installation.

.2 Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.

.3 Store and protect products in accordance with manufacturer's recommendations. Protect from damage and staining.

1.7 **WARRANTY**

.1 Warranty the Work of this Section for a period of **Ten (10) Years** from date of Substantial Performance of the Contract, in writing.

.2 Provide manufacturer’s standard twenty (20) year warranty for rigid tunnels.

.3 Provide manufacturer’s five (5) year warranty for electrical parts.

.4 Warranties shall include all materials and labour, for the repair or replacement of warrantied items at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Tubular skylight devices shall be as manufactured Solatube International Inc., distributed in Ontario by Bravura Daylighting Specialists.

2.2 MATERIALS

.1 Tunnel skylights shall be Solatube "SolaMaster" Series, model 750 DS-C (at closed Acoustic Tile Ceiling) daylighting system.

.1 Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.

.1 Outer Dome Glazing: Type DA, 3.2 mm minimum thickness injection moulded acrylic classified as CC2 material; UV inhibited, impact modified acrylic blend.

.2 Inner Dome Glazing: Type DAI, 3 mm minimum thickness acrylic classified as CC2 material.

.3 Raybender 3000: Variable prism optic moulded into outer dome to capture low angle sunlight and limit high angle sunlight.

.2 Flashing System: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.

.1 Base Material: Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M, 0.7 mm thick.

.2 Base Style: Insulated curb cap, R6 min., with inside dimensions of 685 mm x 685 mm to cover curb as specified in Section 07 51 00.

.3 Flashing Insulator: Type FI, Thermal isolation material for use under flashing.

.3 Tube Ring: Attached to top of base section; 2.3 mm nominal thickness injection moulded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.

.4 Tube Ring Seal: Attached to base of dome ring, 6mm diameter butyl glazing rope, to minimize air infiltration.

.5 Dome Seal: Adhesive backed weatherstrip 16 mm tall by 7 mm.

.6 Roof Flashing Turret Extensions:

.1 Where indicated on drawings, provide manufacturer's turret extensions above roof level. Extensions shall be one piece, in manufacturer's standard lengths.

.7 Reflective Tubes: Aluminum sheet, thickness 0.5 mm. Provide tubes to arrangement indicated on drawings and as required for the complete assembly.

.1 General:

.1 Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm) less than 93 percent.

.2 Colour: a* and b* (defined by CIE L*a*b* colour model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.

.3 Tube diameter to match skylight diameter.

.2 Top Tube Angle Adapter and Bottom Top Tube Angle Adapter:

.1 Reflective 30 degree adjustable top and bottom angle adapters, 406 mm long

.3 Extension Tube:

.1 Reflective extension tube, Type EXX, Notched for Open Ceiling diffuser attachment, of length required for installation as shown on drawings.

.4 90 Degree Adjustable Tube:

.1 Reflective 0 to 90 degree extension tube angle adapters.

.5 Diffuser Assemblies for 530mm Tubes Penetrating Ceilings:

.1 Solatube Model 750 DS C ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 605mm by 605mm square frame to fit standard suspended ceiling grids or hard ceilings.

.1 Metal transition box, type TM, metal round to square comprised of Spectralight Infinity SoftLight material with structured finish on exposed reflective surface, 0.4mm thick.

.2 Natural Effect Lens made of acrylic, classified as CC2, Class C, 1.5mm thick, with open cell foam seal to minimize condensation and bug, dirt, and air infiltration per ASTM E283.

.3 Lens: Type L5 OptiView Wide Fresnel lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be greater than 90 percent at 0.6mm thick. Classified as CC2.

.6 Local Dimmer Control: Provided with dimmer switch and cable.

.2 Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, size 22 cable; providing daylight output between 2 and 100 percent. Provided with dimmer switch and all cable.

.3 Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: only one switch is required per set of synchronously controlled dimmers.

.4 Cable: Type CA, Two conductor low voltage cable for multiple unit DC connection. Provide all cable required for the complete work of this Section..

.8 Accessories:

.1 Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required.

.2 Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

.3 Security Kit: Type SK Dome Security Kit, rivets with nylon spacers to replace dome screws.

.4 Security Bar: Type B Security Bar 9.5mm diameter stainless steel bar across flashing diameter opening.

.5 Security Guard: Pre-installed stainless steel rods welded into a hexagonal grid, rivetted into the curb cap turret at all SkyVault daylighting devices.

.6 Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection moulded nylon.

.7 Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

2.3 **FABRICATION**

.1 Finish, fabricate and prepare all Assemblies in shop, under responsibility of the manufacturer.

.2 Fabricate to allow for thermal movement of materials.

.3 Provisions shall be made to insure against accumulated water in contact with system components.

PART 3 - EXECUTION

3.1 **EXAMINATION**

.1 Confirm that existing conditions are satisfactory before commencing installation. Check structural elements and adjoining work on which this work may depend. Verify dimensions of openings and minimum clearances. Verify that openings are level and plumb.

.2 Notify Consultant, in writing, if conditions are not acceptable. Do not commence work until such unsatisfactory conditions are corrected.

.3 Commencement of installation will signify acceptance of existing conditions. No extras will be considered due to subsequent problems related to unsatisfactory conditions of openings and surfaces.

3.2 **PREPARATION**

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 **INSTALLATION**

.1 Provide all fastenings or anchors required to be built in by work of other Sections. Use only concealed fastenings.

.2 Coordinate with other trades performing work related to this section, particularly those installing roofing, ceilings and bulkheads, and electrical work. Coordinate locations and installation of dimmers switches in walls.

.3 Install in accordance with manufacturer's installation instructions.

.4 Securely install components so that they line up square in true, straight flat and/or flush planes, plumb and level, free from distortion.

.5 Attach tunnel skylight system to site built roof curb with manufacturer's screws to accommodate construction tolerances and other irregularities.

.6 Make joints neat and fine as practicable. Allow for full expansion and contraction and take into consideration climatic conditions prevailing at time of installation.

.7 Fasten galvanized steel supports and clips with galvanized bolts and fasten aluminum members with stainless steel screws and bolts.

.8 Coordinate attachment and seal of perimeter air and vapour barrier material.

.9 Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.

.10 Ensure that all joints are weathertight.

.11 After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Consultant, and General Contractor, or their designated representatives. Correct if needed before proceeding with installation of subsequent units.

3.4 **PROTECTION**

.1 Protect installed products until completion of project.

.2 Touch-up, repair or replace damaged products before Substantial Performance.

3.5 **CLEANING**

.1 When directed, inspect work and remove protective wrappings, coatings and devices and clean skylight and shaft surfaces. Use methods which will not scratch or damage skylight, paint or coatings.

.2 Perform final cleaning as per Section 01 74 00.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 This specification includes supply, installation, and inspection of all hardware included on the hardware list included at the end this Section. The division of work is the responsibility of the General Contractor.

.2 Supply and installation of door hardware for wood and hollow metal doors.

.3 Supply of locksets for 38 mm thick doors at tall millwork units, for installation by millwork subtrade.

.4 Supply and installation of automatic operators, emergency call hardware, push to lock, and accessories.

.5 Supply and installation of low voltage wiring for hardware. Conduit is supplied and installed under Division 26.

.6 Coordination with electrical Subcontractor to ensure all electrical requirements are met and all back boxes and conduit are placed to suit hardware requirements.

.7 Supervision and inspection of door hardware installation by hardware supplier.

.8 Final inspection and certification by hardware supplier's Architectural Hardware Consultant (AHC), paid by Contactor.

1.2 RELATED SECTIONS

.1	Architectural Casework	Section 06 41 13
.2	Hollow Metal Doors and Frames	Section 08 11 13
.3	Wood Doors	Section 08 14 00
.4	Electrical	Division 26

1.3 PRODUCTS SUPPLIED BUT NOT INSTALLED IN THIS SECTION

.1 Power supplies, compressor/control boxes, junction boxes installed by Division 26.

1.4 REFERENCES

.1 CAN/CGSB-69.17-M Bored and Pre-assembled Locks and Latches
.2 CAN/CGSB-69.18-M/ANSI/BHMA-A156.1 Butts & Hinges
.3 CAN/CGSB-69.19-M/ANSI/BHMA-A156-3 Exit Devices
.4 CAN/CGSB-69.20-M/ANSI/BHMA-A156-4 Door Controls (Closers)
.5 CAN/CGSB-69.29/ANSI/BHMA-A156-13 Mortise Locks & Latches
.6 CAN/CGSB-69.34/ANSI/BHMA-A156.18 Materials & Finishes
.7 Canadian Steel Door & Frame Manufacturers Association (CSDFMA), Canadian Metric Guide for Steel Doors & Frames (Modular Construction
.8 NFPA 80-Standard for Fire Doors and Windows
.9 Door and Hardware Institute Recommended locations for Architectural Hardware for Standard Steel Doors and Frames

.10	Door and Hardware Institute	Recommended locations for Architectural Hardware for Flush Wood Doors
.11	Door and Hardware Institute	Sequence Format for Hardware Schedule
.12	Door and Hardware Institute	Key Systems and Nomenclature
.13	Door and Hardware Institute	Abbreviations and Symbols used in Architectural Door and Hardware Schedules and Specifications,
.14	Door and Hardware Institute	Installation Guide for Doors and Hardware

1.5 **ALLOWANCES**

.1 A cash allowance is included in the contract to cover the cost of an independent inspection and is to be expended at the Owner's discretion. Provision of this allowance shall not infer the deletion of any requirements for inspection by the hardware supplier, as specified below.

.2 Expend allowance as directed by the Consultant and in accordance with Section 01 10 00.

1.6 **SUBMITTALS**

.1 Door and Hardware List

.1 Submit six copies of a detailed final door hardware list prepared by a qualified Architectural Hardware Consultant.

.2 List all items to be furnished and delivered under this section.

.3 Indicate door hardware proposed, identifying each item by manufacturer name, manufacturer's catalogue model number, material, function, finish, location, and other pertinent information.

.4 The list shall be in the same format as the door hardware list bound in this project manual.

.5 Approval of the Final Door Hardware List by the Consultant and the Owner shall not relieve the Contractor from responsibility for providing all required door hardware.

.2 Product Data:

.1 Within ten (10) calendar days after award of hardware supply subcontract, submit:
In a three ring binder six (6) copies of product data sheets with the finish hardware schedule showing all items of hardware to be used on the project. Identify each hardware item supplied under this section by product number, function, hand & finish. Finish hardware schedule to be in conformance of door and Hardware Institute Standards. Six (6) copies of catalogue cuts and other data required to identify individual components listed and/or to demonstrate compliance with specified requirements for all items contained in the finish hardware set. Submission of manufacturer's full line brochure is not acceptable.

.3 Samples:

.1 When requested in writing, provide (to the Consultants Site Office) one sample of each hardware item complete with fasteners, within fifteen (15) calendar days of award of a purchase order. Samples to be clearly labelled with their hardware schedule designation, installation location, and manufacturers' name and model number. Samples will be returned; approved samples may be incorporated into the work.

.2 Substitute new samples for those rejected by the Consultant.

.3 Do not supply door hardware to the site until all samples are approved by the Consultant.

.4 Templates:

.1 Furnish templates within ten (10) calendar days of being requested by the Consultant and/or door & frame manufacturer, the Contractor must submit templates for door and frame preparations and/or mounting of finish hardware items, and identify each template by label indicating applicable specification paragraph number, brand name & number, door number & hardware package number.

.5 Keying Schedule:

.1 Provide three (3) copies of keying schedule for review prepared and detailed in Reference 1.5.5. Include all special keying notes and stamping instructions. Locks and cylinders are not to be ordered until the key schedule has been approved by the owner.

.6 Wiring Diagrams:

.1 Furnish a written description of the functional use of all electrical hardware. Include door and frame elevations showing the location of each item of electrical hardware to be installed, including a diagram showing number and size of all conductors. Include drawings showing all terminal connections

.7 Operations and Maintenance Data:

.1 Prior to Substantial Performance, provide the following information for inclusion in the Maintenance manuals, in accordance with Section 01 78 00, Closeout Submittals:

.1 Name of hardware distributor, address and contact name
.2 Copy of final "as-built" finish hardware schedule
.3 Wiring diagrams, elevations, risers, point to point
.4 Copy of final keying schedule
.5 Copy of floor plans with keying nomenclature assigned to door numbers as per the approved keying schedule
.6 Maintenance instructions for each product
.7 Catalogue cut sheets and product specifications for each product
.8 Parts list for each product
.9 Installation instructions for each product
.10 A copy of the certification letter from the AHC, confirming the correct supply and installation of hardware, as required by Subsection 3.3, below.

.8 Maintenance Materials:

.1 Provide maintenance materials, in accordance with Section 01 78 00, Closeout Submittals.

.2 Supply four sets of wrenches for door closers, locksets, latchsets, and exit devices.

.3 Supply five sets of other special parts or tools required for proper maintenance and adjustment of door hardware, including those used for locks/passage/privacy, all type of door closers, and all exit devices.

1.7 **QUALITY ASSURANCE**

.1 The hardware supplier shall thoroughly review the door hardware list included with this project manual, the architectural door and frame schedule, and all drawings prior to preparing the door hardware list required above. Confirm that hardware listed is appropriate in size, function, and material for the installation indicated, conforms to applicable codes, and is provided in sufficient quantities. Advise the Consultant immediately, in writing, of any conflicts, discrepancies, or omissions.

.2 Contractor shall coordinate a hardware pre-installation meeting with hardware installer, hardware supplier and hardware sub-consultant (original hardware specifier). Payment for original hardware sub-consultant's time to attend meeting shall be paid for through the cash allowance included for inspections (except where hardware supplier is also the hardware sub-consultant). Review installation procedures with the hardware suppliers.

.3 Supplier and installer shall hold regular review meetings (at least every second week) during the installation period. Submit minutes of meetings to the Consultant.

.4 The Contract contains a cash allowance for independent inspection, as noted in subsection 1.5, above. Supplier and installer shall attend such inspections; costs associated with their attendance shall be included in the Contract.

.5 Hardware for doors in fire separations and exit doors shall be certified by a Canadian Certification Organization accredited by the Standards Council of Canada.

.6 Substitutions:

.1 Only approved products specified will be accepted. Make substitution request in accordance with Division 01. Include product data and indicate benefit to the project.

.7 Supplier Qualifications:

.1 Successful hardware distributor to have a minimum of five (5) years experience in the door and hardware industry. The distributor to have on staff an Architectural Hardware Consultant (A.H.C.) who will be responsible for scheduling, detailing, ordering and co-ordination of the finishing hardware for this project. This individual shall be required for jobsite visits, as outlined below and when so requested by the Architect.

.8 Designated Installer:

.1 Hardware Installers must have a minimum of five (5) years experience in installation of hardware. Provide verification of installer's qualification to Consultant for approval. All installers to attend review meetings with the Hardware Distributor.

1.8 **GENERAL REQUIREMENTS**

.1 Hardware shall comply with requirements of authorities having jurisdiction.

.2 Hardware for doors in fire separations and exit doors shall be certified by a Canadian Certification Organization accredited by the Standards Council of Canada.

.3 All door closers shall have back checking features and shall be of proper size to operate door efficiently.

.4 Confirm all kick plate and threshold sizes before ordering them.

.5 Use no wall stops on drywall.

.6 Exposed screws for installing hardware shall have Phillips or Robertson heads.

.7 Rim panic device strikes shall be mortise type application. Equip panic devices with six bolts.

.8 Floor stops shall not be permitted.

1.9 **PRODUCT DELIVERY, STORAGE AND HANDLING**

.1 Marking and Packaging:

.1 All cartons shall be marked with heading number, door number, and key-set symbol where applicable in original packaging provided by the manufacturer. Pack packaged hardware in suitable wrappings and containers to protect it from damage during shipping and storage. Accessories, fastening devices and other loose items shall be enclosed with each applicable item of hardware.

.2 Delivery:

.1 Deliver hardware to those who are to install it, complete with keys, templates and installation instructions together with all required screws, expansion shields, anchors, jigs and other related accessories for satisfactory attaching or installing hardware.

.3 Storage

.1 Store in a clean, dry room with lockable man door and adequate shelving to permit organization so item numbers are readily visible.

1.10 **WARRANTY**

.1 Provide warranties by the accepted manufacturers:

Hardware Item	Length of Warranty
Mortise Hinges	Lifetime
Locks(ND-Series)	7 yrs.
Locks(All other Series)	2 yrs.
Exit Devices	3 yrs.
Door closers -mechanical	10 yrs.
Door Operators - Electro mechanical	2 yrs.
Door Hold open Devices - Electro mechanical	2 yrs.
Overhead stops/holders	2 yr.
Floor/Wall stops	2 yr.
Electric Strikes/Key Switches/Power Supplies	2 yr.

.2 **Where manufacturers standard warranty period exceeds these requirements, it shall prevail.**

.3 Door hardware warranties shall cover all defects in material and workmanship that become apparent during the warranty period and such defects shall be made good or the defective product shall be replaced, to the satisfaction of the Owner and at no cost to the Owner.

1.11 **MAINTENANCE**

.1 Maintenance Service:

.1 After the building is occupied arrange an appointment with the Owner's maintenance staff for instruction of proper use, servicing, adjusting and lubrication of hardware furnished. Submit to the consultant a list of attendees and meeting date.

.2 Extra Materials:

.1 Provide Owner with maintenance materials as specified above.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Products listed in the finishing hardware schedule are from the manufacturers listed below:

.1 **ABBREVIATION**	**MANUFACTURER NAME**
CBH	Canadian Builders Hardware Mfg. Inc.
CAM	Camden Door Controls
FIN	Finger Safe - Canada
GJ	Glynn-Johnson, Allegion Canada Inc.
HES	HESS
IVES	Ives, Allegion Canada Inc.
KNC	K.N. Crowder Mfg. Inc.
LCN	LCN Door Closers, Allegion Canada Inc.
SCE	Schlage Electronics, Allegion Canada Inc
SCH	Schlage Locksets, Allegion Canada Inc.
VON	Von Duprin, Allegion Canada Inc.
ZERO	Zero International Inc. Allegion Canada Inc.

2.2 **MATERIALS**

.1 Screws and Fasteners:

.1 All screws shall be matching finish to their product and shall be manufacturer's standard. Door closers, door holders and exit devices installed on fire rated wood doors and hollow metal doors shall be attached with sex nuts and bolts.

.2 Materials and Acceptable Manufacturers

.1 Note: Supply all products in a given category from the same manufacturer unless other wise indicated on Hardware Schedule. In the event of a conflict between these specifications and the items specified on the Hardware Schedule, the Hardware Schedule shall govern.

.2 Mortise Hinges:

.1 Furnish three knuckle concealed bearing hinges with NRP option on all reverse bevel doors with locking hardware. Hinge width to accommodate door closer projection, door trim and allow for 180-degree swing. Doors up to 2286mm in height, supply 3 hinges, doors greater than 2286mm in height add one hinge for every additional 760mm of door height. Doors 925mm wide and less furnish 114 mm high hinges, doors greater than 925mm wide furnish 127mm high hinges, heavy weight or standard weight as specified. Supply ferrous (steel), stainless steel material for all interior and/or fire-rated doors and stainless steel for exterior doors.

As Specified: Ives Hinges, 5BB1, 5BB1HW

.3 Constant Latching Flush Bolts/Flush Bolts/Roller Catch:

.1 Constant Latching Flush Bolts-Metal Doors:

.1 Constant latching flush bolts for metal doors to be cUL listed for 3-hour fire doors. Inactive door remains latched until the active door is opened, releasing the automatic bottom bolt and then the top bolt can be manually released. Inactive door will relatch automatically. Supply dustproof strikes with all flushbolts.

Supply as Specified Ives FB50 series

.2 Manual Flush Bolts-Metal Doors:

.1 Manual flush bolt for metal doors to be cUL listed for 3-hour fire doors with 12.7mm diameter bolt tip with 19mm throw. Standard rod length to be 305mm, supply longer length rods to suit higher height doors. Supply dustproof strikes with all flushbolts.

Supply as Specified: Ives FB458 series

.3 Roller Latch:

.1 Roller latch constructed of brass or stainless steel. Roller latch to have maximum projection of 12.7mm allowing for variance in the door clearance. Projection of the roller by turning the knurled knob on the back of the latch. Roller latch to fit heavy duty cylindrical latch cutout, non handed, nylon roller standard, optional roller nylon covered brass roller, optional ASA strike.

Supply as Specified: IVES RL32

.4 Locksets/Passage Sets/Privacy Sets:

.1 Cylindrical-Lever:

.1 Standard duty commercial exterior and interior cUL listed for all functions up to 3-hour doors. Levers to be solid pressure cast zinc with no plastic inserts. Grade 2 lever sets to have through bolts to prevent chassis rotation with internal components and chassis constructed of cold rolled steel with zinc dichromate plating to resist corrosion. Lever sets to have independent heavy duty compression springs as well as precision laser cut stainless steel spindles with interlocking on keyed side.

Supply as Specified: Schlage "AL" series

.2 Cylindrical:

.1 Extra heavy duty residential, commercial, institutional and industrial applications. Latch bolts to be steel with minimum 12.7mm throw deadlocking on keyed and exterior functions. 19mm throw anti-friction latchbolt on pairs of fire doors. Provide manufacturer's standard wrought box strike for each latch or lock, with curved lip extended to protect frame. Locks and latchsets tested to exceed 3,000,000 cycles. Lock case to be steel, incorporate one piece spring cage and spindle. Precision solid brass 6-pin cylinder with nickel silver keys available in all Schlage keyways. All levers to be solid with no plastic inserts.

Supply as Specified: Schlage "ND" series

.3 Strike Plates:

.1 Provide lockset and latchset strike plates with lip centre dimensions sized to minimally clear trim. Where strike lip extends beyond the projection of the casing or other trim, provide curved lip strikes. Strike plates applied to inactive leaf of paired openings to have flat lip sized to fit flush with the face of the door skin.

.5 Exit Devices/Exit Device Trims/Mullions:

.1 Heavy Duty

.1 Exit device to be cUL listed for panic hardware and fire exit hardware. Supply exit devices and fire exit devices featuring coil compression springs on all device mechanism subassemblies and dead latching mechanisms for all active latchbolts. Supply exit devices with smooth mechanism case and "the quiet one" fluid dampener to eliminate noise associated with exit device operations. Non-handed device with touchpad assemblies with no exposed fasteners and cast end caps, reinforced aluminum with stainless steel touchpad and raised edge to minimize pinching. Roller strikes to be standard on all rim and surface vertical rod devices. Doors greater than 915mm wide supply long bar exit devices, doors greater than 2134mm high supply extension rods for required series. 1,000,000cycle testing independently certified by ETL.

Supply as Specified: Von Duprin 98 series

.2 Device Trim:

.1 Supply device trim featuring recessed cylinder mounting and coil compression spring design with shear pin protection for all lever designs. Similar lever designs for exits as specified for locksets.

Supply as Specified Von Duprin 996 series

.3 Mullions Rated:

.1 Fire rated cUL approved mullion for up to three hour openings up to 2440 x 2440mm using Von Duprin rim devices prepared for 499F strikes. Supply with key removable kit to provide quick removal to provide single door performance and security on double door applications.

Supply as Specified: Von Duprin KR9954

.4 Mullions Rated:

.1 Fire rated cUL approved mullion for up to three hour openings up to 2440 x 2440mm using Von Duprin rim devices prepared electric strike and one 499F strikes for use with all Von Duprin rim devices and key removable kit to provide quick removal to provide single door performance and security on double door applications.

Supply as Specified: Von Duprin 4854 c/w KR54-F Kit

.6 Door Closers/Auto Door Operators:

.1 Door closers to have the following features (see separate closer sections below for further information):

.1 fully hydraulic, rack and pinion action with high strength cast iron cylinders and one piece forged steel pistons.

.2 include high efficiency, low friction pinion bearings.

.3 hydraulic fluid of a type requires no seasonal adjustments, ULTRA X ™ fluid has constant temperature control from -35°C to +49°C

.4 hydraulic regulation controlled by tamper-proof, non-critical screw valves, adjustable with a hex wrench.

.5 separate adjustments for backcheck, general speed and latch speed.

.6 door closers with special template (ST-) numbers include all required associated product, information sheets and instructions

.7 size 1 manual door closers to provide less than 5 pounds opening force on a 900mm door leaf.

.8 door closer with Pressure Relief Valves are not accepted.

.9 door closer bodies, arms, covers to be powder coated

.10 closers with painted finishes shall exceed a minimum 100-hour salt spray test, as described in ANSI A156.18 and ASTM B117.

.11 closers detailed with plated finishes shall include plated covers (or finish plates), arms and visible fasteners.

.2 Medium Duty Mechanical:

.1 Non-sized (1-6) and non-handed cylinder body to have 32mm piston diameter with 16mm single heat-treated shaft. Track closer cylinder body non-sized (2-4) or (1-2). Closers to have forged main arm and forearm, forged steel main arm and forearm EDA and CUSH type arms). Optional arms to be interchangeable within the series of closers, except track arm type closers. Track arm type closers to have single lever arm with low friction track and roller assembly and provisions for an optional bumper to assist backcheck.

Supply as Specified:LCN 1460 HD series

.3 Heavy Duty Mechanical:

.1 Non-sized (1-5) and handed cylinder body to have 38mm piston diameter with 17.5mm double heat-treated shaft and certified to exceed ten million (10,000,000) full load operating cycles by a recognized independent testing laboratory. Track closers sized 1, 3 or 4.Closers to have forged steel main arm. Optional arms to be interchangeable within the series of closers, except track arm type closers. Track arm type closers to have single lever arm with low friction track and roller assembly and provisions for an optional bumper to assist backcheck.

Supply as Specified:LCN 4010 series

.4 Heavy Duty Mechanical:

.1 Non-sized (1-5) and handed cylinder body to have 38mm piston diameter with 17.5mm double heat-treated shaft and certified to exceed ten million (10,000,000) full load operating cycles by a recognized independent testing laboratory. Track closers sized 1,3 or 4. Closers to have forged steel main arm. Optional arms to be interchangeable within the series of closers, except track arm type closers. Track arm type closers to have single lever arm with low friction track and roller assembly and provisions for an optional bumper to assist backcheck.

Supply as Specified:LCN 4020 series

.5 Heavy Duty Mechanical:

.1 Non-sized (1-5) and handed cylinder body to have 38mm piston diameter with 17.5mm double heat-treated shaft and certified to exceed ten million (10,000,000) full load operating cycles by a recognized independent testing laboratory. Track closers sized 1,3 or 4.Closers to have forged steel main arm and forearms. Optional arms to be interchangeable within the series of closers, except track arm type closers. Track arm type closers to have single lever arm with low friction track and roller assembly and provisions for an optional bumper to assist backcheck.

Supply as Specified:LCN 4110 series

"NOTE: ALL LOW ENERGY OPERATORS SUPPLIED AND INSTALLED BY THIS SECTION

.6 Heavy Duty Electric Operator:

.1 Non-sized (2]5) and non]handed cylinder body to have 38mm piston diameter with 17.5mm double heat-treated shaft and certified to exceed ten million (10,000,000) manual full load operating cycles by a recognized independent testing laboratory. Power operator to include:

.1 Provisions for separate conduits to carry high and low voltage wiring in compliance with the National Electrical code.

.2 "Second Chance" function: program within the on-board computer monitoring resistance during opening cycle. If resistance is present operator pauses for a few seconds, then attempts to open door again. If resistance does not exist door will open normally. However if resistance still exists, door will pause and the unit will time out and door will close.

.3 "Breakaway" drive system: System within the motor/clutch assembly. If the door is forced closed while in the opening cycle, the clutch slips preventing damage to the operator, door and frame.

.4 "Soft Start" motor control: required for controlled start once actuator is depressed to extend the service life of drives components.

.5 "Built in Power Supply" to deliver 12V and 24V outputs up to a max. 1.0 amp.

.6 Certified by cUL for use on labelled doors.

.7 Independent adjustments for electrically controlled functions within controller module.

Supply as Specified: LCN 4640, 4631 series

.7 Actuators:

.1 Wall Type

.1 Wall plate switch to be hard-wired either 12VDC or 24VDC actuator with round, stainless steel touch plate in either diameters. Engraved blue filled handicap symbol conforms to most accessibility codes. Units to include heavy grade components for vandal resistant mounting and weather resistant switch standard.

Supply as specified: LCN 8310-852T, 8310-876

.7 Overhead Door Stops/Holders:

.1 Heavy Duty Surface Mounted:

.1 Surface overhead stops/holders to be stainless steel base, non-handed for single-acting doors with a heavy-duty channel/slide-arm design and offset jamb bracket to allow for simple field modifications of functions. Channel to be surface mounted to the door with thru bolts and the jamb bracket is surface mounted to the jamb.

Supply as Specified: Glynn-Johnson 900 series

.2 Heavy Duty Concealed Mounting:

.1 Concealed overhead stops/holders to be stainless steel base, non-handed for single or double-acting doors with a low profile channel, mortised in the door and jamb bracket is mortised in the doorframe. Unit to be fully concealed when door is in the closed position. Units to be field adjustable for function changes if required.

Supply as Specified: Glynn-Johnson 100 series

.3 Medium-Duty Surface Mounting:

.1 Surface overhead stops/holders to be stainless steel base, non-handed for single-acting doors with a channel/slide-arm design and offset jamb bracket to allow for simple field modifications of functions. Channel to be surface mounted to the door with thru bolts and the jamb bracket is surface mounted to the jamb.

Supply as Specified: Glynn-Johnson 450 series

.8 Door Pulls/Flatware/Coat Hooks:

.1 Door Pulls are to be 19 mm, 25.4 mm diameter
.2 All flatware to be of stainless steel material, .050 gauge.

Supply as Specified: CBH 7008-1, CBH 7523 1B (Door Pull) mounting as indicated in the hardware sets.
CBH 903 T304 B4E (Kickplates 40mm less door width single door and 25mm less door width double doors)

.9 Floor/Wall Stops:

.1 Floor Stops: No floor stops permitted.

.2 Wall Stops (No Button on Locking Hardware):

.1 Wall stops to be constructed of stainless steel or brass/bronze base with special retainer cup that makes the rubber stop tamper resistant. Convex design of rubber bumper.

Supply as Specified: Ives WS401CVX

.10 Weather/Smoke/Sound Seals:

.1 Supply as Specified:

KN Crowder	W-20S (head seal)
Note: Mount head seal prior to soffit mounted hardware.	
KN Crowder	W-50S (jamb seal)
KN Crowder	W-21 (head/jamb seal)
KN Crowder	W-25 (meeting stile astragal)
KN Crowder	CT-730 (Door Bottom)

.11 Thresholds/Weatherstrip/Door Sweeps:

.1 Supply as Specified:

KN Crowder	W-24S (Door Sweep)
KN Crowder	CT-41-1 (Threshold)
KN Crowder	CT-42-1 (Threshold)
KN Crowder	CT-46 (Threshold)
KN Crowder	CT-10 (Threshold)

.12 Electric Strikes, Electro-Magnetic Door Holders:

.1 Electric Strikes:

.1 Grade 1, electric strikes to be cUL listed burglary-resistant and electric strike for fire doors and frames. A label for single doors and B label for double doors. Electric strikes to be stainless steel construction, non-handed available in 12V or 24V AC or DC with continuous duty solenoid and accept ¾" throw latchbolts. Strike box to be adjustable to compensate for any misalignment of the door or frame with two piece plug connector for ease of installation.

Supply as Specified: Von Duprin 6000 series

.2 Electro-Magnetic Door Holders:

.1 Provide floor and wall mounted units to hold door in open position and to release and automatically close under fire alarm conditions. Electromagnet shall be protected against transients and voltage surges up to 600 volts. Power requirements, tri-voltage.

Supply as Specified: LCN-SEM 7800 series

.13 Electric Washroom Accessories:

.1 Provide electric washroom accessories to compete the installation of automatic door operators for universal and barrier free washroom requirements

.1 Supply as Specified:
.1 Camden - Push to lock, CM-46/8/GRF/SFE1
.2 Camden - Illuminated Actuator CM-46/4/GRF/SFE1
.3 Camden - Advanced Logic Relay CX-33
.4 Camden - Emergency Call Kit CX-WEC10K2

2.3 FINISHES

.1 Unless other wise specified, all finishes to be brushed chrome (626).

.2 Finishes are specified as follows:

Item	BHMA#	Description	Base Materials
Hinges	630	satin,stainless steel	stainless steel
Hinges	652	satin chrome plated	steel
Continuous Hinges	628	anodized aluminum	aluminum
Lock Trim	626	satin chrome plated	brass/bronze
Exit Devices	626	satin chrome plated	brass/bronze
Door Closer	689	powder coat aluminum	steel
Magnetic Wall Holders	689	powder coat aluminum	steel
Door Pulls	630	satin stainless steel	stainless steel
Protective Plate	630	satin stainless steel	stainless steel
Door Stops/Holders			
Overhead	630	satin stainless steel	stainless steel
Wall/Floor	626	satin chrome plated	brass/bronze
Thresholds	628	anodized aluminum	aluminum
Weatherstrip	628	anodized aluminum	aluminum
Miscellaneous			
Mullions	689	powder coat aluminum	steel
Electric Strikes	630	satin stainless steel	stainless steel

2.4 CYLINDERS, KEYING SYSTEMS AND KEY CONTROL

.1 Meet with the Owner to finalize keying requirements and obtain keying instructions in writing as outlined in Division 01. Interior Locks, cylinders and keys shall be furnished with Schlage patented “Everest C Open” full size key sections. Exterior cylinders to be furnished to an existing Sargent V10 keyway, key to the owner existing key system.

.2 Provide temporary construction keying system during construction period at all locks. Permanent keys will be furnished to the Owner’s Representative prior to occupancy. The Owner or Owner’s Security Agent will void the operation of the construction keys.

.3 Permanent cylinders to be keyed by factory, combinated in sets or subsets, master keyed or great grand master keyed, as directed by Owner Permanent keys, keyblanks and cylinders shall be stamped with the applicable blind code for identification. These visual key control marks or codes will not include the actual key cuts. Stamp cylinders with concealed visual keying for added security. Permanent keys will also be stamped "Patented". Keys and cylinder identification stamping to be approved by Architect and Owner. Failure to properly comply with these requirements may be cause to require replacement of all or any part of the cylinders and keys involved as deemed necessary at no additional cost to the Owner.

.4 Equip locks and cylinders with patent protected, full size cylinders with nickel silver blocking pin to check for patented feature on keys. Provide a minimum of six pins with nickel silver bottom pins. Cylinders must allow for multiplex master keying, combinated to Owner's instructions.

.5 Provide complete cross-index system, place keys on markers and hooks in the cabinet as determined by the finial key schedule. Provide one each key cabinet and hinged panel type cabinet for wall mounting. See misc. hardware group for model number.

.6 Deliver all permanent key blanks and other security keys direct to Owner's representative from factory by secure courier, return receipt requested. Failure to properly comply with these requirements may be cause to require replacement of all or any part of the cylinders and keys involved as deemed necessary at no additional cost to the Owner.

.7 Furnish keys in following quantities, furnish a sum total of three (3) change keys per cylinder. This sum total of keys to be cut and furnished as directed by Owner. Any unused balance of cut change keys shall be furnished as key blanks directly to Owner with the cut Keys.

.8 **All keying requirements to be confirmed by owner.**

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Ensure that doors and frames are properly prepared and reinforced to receive finish hardware prior to installation.

.2 Ensure that door frames and finished floor are sufficiently plumb and level to permit proper engagement and operation of hardware.

.3 Submit in writing a list of deficiencies determined as part of inspection required in 3.1.1 and 3.12 to supervising consultant prior to installation of finished hardware.

3.2 INSTALLATION

.1 Hardware Installers must have a minimum of five (5) years experience in installation of hardware. Provide verification of installer's qualification to Consultant for approval. All installers to attend review meetings with the hardware distributor.

.2 Install hardware at mounting heights as specified in the manufacturers templates or specific references in approved hardware schedule or approved elevation drawings.

.3 Where mounting height is not otherwise specified, install hardware at mounting heights as per referenced standards.

.4 Install hardware using only manufacturer supplied and approved fasteners in strict adherence with manufacturers published installation instructions.

.5 Ensure that all locksets / latchsets / deadlocks are of the correct hand before installation to ensure that the cylinder is in the correct position. **Handing is part of installation procedure.**

.6 Ensure that all exit devices are of the correct hand and adjust device cam for proper outside trim function prior to installation. **Handing is part of installation procedure.**

.7 Follow all manufactures installation instructions. Adjustment is inclusive of spring power, closing speed, latching speed and back-check at the time of installation.

.8 Delayed action door closers are to be adjusted to forty (40) second delay for handicapped accessibility and movement of materials. Time period to be approved by Owner.

.9 Install head seal prior to installation of "PA"-parallel arm mounted door closers and push side mounted door stops/holders. Trim, cut and notch thresholds and saddles neatly to minimally fit the profile of the door frame. Install thresholds and saddles in a bed of caulking completely sealing the underside from water and air penetration.

.10 Counter sink through bolt of door pull under push plate during installation.

.11 Install blocking material of sufficient type and size in cavities of metal and wood stud walls and partitions. Located concave and convex type door bumpers at the appropriate height to properly contact protruding door trim.

3.3 **FIELD QUALITY CONTROL**

.1 Verify each door leaf opens closes and latches properly. Inspect fire rated openings to ensure they are installed in compliance with NFPA 80 requirements. Test access control system and electrified hardware devices for proper operation, owner to sign off on verification of operation. Verify electric door release hardware operates properly upon activation of the fire alarm system.

.2 Finishing Hardware supplier's Architectural Hardware Consultant shall perform on-site inspections every two weeks during hardware installation and provide inspection reports listing progress of work, unacceptable work and corrective measures. Repair or replace as directed by the Consultant.

.3 Upon completion of finish hardware installation, the Architectural Hardware Consultant and the Contractor shall inspect work and provide a list of all hardware deficiencies. The Architectural Hardware Consultant shall re-inspect when notified by the Contractor as to the clearing of deficiencies. Final inspection must ensure all hardware items operate as per manufacture requirements. Coordinate inspections with manufacturer's representatives as required to establish warranties.

.4 Once any deficiencies have been corrected, the Architectural Hardware Consultant and the Contractor shall certify in writing that all hardware items and their installation are in accord with requirements of Contract Documents.

.5 At the discretion of the Owner, a third party inspection may be required. Contractor shall arrange for post installation review of hardware by an independent hardware sub-consultant appointed by, or acceptable to, the Owner (original hardware specifier or other independent hardware sub-consultant). The deficiency report shall be prepared by the independent hardware sub-consultant. The cost of the first inspection and one follow-up inspection only, shall be paid through the cash allowance included for hardware inspection. The cost of any subsequent inspections, required for the correction of deficiencies, shall be borne by the Contractor.

3.4 ADJUSTING AND CLEANING

.1 Check and make final adjustments to each operating item of hardware on each door to ensure proper operation and function.

.2 Adjust doors with self closing devices or automatic closing devices for proper operation after the HVAC system is balanced and adjusted. Verify spring power of non sized door closers is properly adjusted.

.3 All hardware to be left clean and free of disfigurements.

.4 Instruct owner personnel in the proper operation, adjustment and maintenance of hardware.

.5 Check all locked doors against approved keying schedule.

3.5 PROTECTION

.1 Protect hardware from damage during construction. Wrap locks panic hardware, fire exit hardware, door pull trim with kraft paper or plastic bubble materials to protect finish from damage until date of substantial completion. Remove and reinstalling or where necessary, using temporary hardware to maintain finish in new condition and maintain manufacturer's warranty

END OF SECTION

CONSULTANT : **KEVIN WILBUR**
CONTRACT # :

REV.#1:

RIVETT ARCHITECTURAL HARDWARE LTD.

FINISHING HARDWARE SCHEDULE

FOR

MURRAY CENTENNIAL PS
654 COUNTY ROAD 40, RR #1
TRENTON, ONTARIO
K8V 5P4

ARCHITECT/ENGINEER/CONSULTANT

MOFFET & DUNCAN

CUSTOMER :	**SUBMITTED BY :**
	RIVETT ARCHITECTURAL HARDWARE LTD. 111 INDUSTRIAL DR., WHITBY, ONTARIO CANADA L1N 5Z9 TEL-905-668-4455 FAX-905-668-4433

kevin@rivett.com
OVER FORTY-SIX YEARS OF EXCELLENCE

HARDWARE INFORMATION AND SPECIFICATIONS

March 13, 2024

FINISH: ALL FINISHES SHALL BE AS INDICATED IN THE FINISHING HARDWARE SCHEDULE BY INTERNATIONAL CODES.

KEYING: **LOCKS WILL COME WITH KEYWAY SPECIFIC TO MURRAY CENTENNIAL PS FINAL KEYING BY OWNER**

INSTALLATION: ALL HARDWARE SHALL BE INSTALLED AND ADJUSTED COMPLETE AS PER THE MANUFACTURERS PRINTED INSTRUCTIONS AND TEMPLATES, BY SKILLED CARPENTERS IN THE APPLICATION OF FINISHING HARDWARE.

PRODUCTS: **MANUFACTURER'S PRODUCTS SHALL ALL BE AS SPECIFIED. ANY EQUALS MUST BE APPROVED IN WRITING AND ONLY IF THEY ARE EQUAL IN DESIGN, FUNCTION, QUALITY, AND FINISH AS LISTED IN SCHEDULE**

HINGES BY HAGER
LOCKS BY SARGENT
CLOSERS BY LCN
EXIT DEVICES BY VON DUPRIN
TRIM HARDWARE BY HAGER
SEALS BY K.N. CROWDER
PDO'S BY BEASAM CANADA
ELECTRIC STRIKES BY HES

HANDLING: WHERE DOORS AND FRAMES ARE TO BE FIELD PAINTED OR FINISHED, ALL HARDWARE SHALL BE REMOVED BY THE GENERAL CONTRACTOR, PRIOR TO SAME. AFTER FINISHING HAS BEEN COMPLETED, THE GENERAL CONTRACTOR SHALL RE-INSTALL ALL THE HARDWARE TO MANUFACTURERS RECOMMENDATIONS.

PACKING: LABEL ALL FINISHING HARDWARE WITH DOOR NUMBERS AND ITEM NUMBERS. THE GENERAL CONTRACTOR SHALL RECEIVE IN A LOCKED DRY STORAGE AREA AND ADVISE WITHIN 24 HOURS OF ANY SHORTAGES.

SUBMITTAL: BEFORE MATERIAL IS ORDERED, SUBMIT (1) ONE COPY OF THE COMPLETED HARDWARE SCHEDULE FOR FINAL APPROVAL. SUPPLY ALL NECESSARY TEMPLATES REQUIRED FOR FABRICATION.

WARRANTY: THE WARRANTY PERIOD SHALL BE ONE (1) YEAR GENERALLY AND TEN (10) YEARS FOR DOOR CLOSERS, THIS SHALL BE SENT TO THE GENERAL CONTRACTOR ON COMPLETION.

OMISSIONS: ANY ITEMS OF FINISHING HARDWARE REQUIRED FOR THIS PROJECT AND NOT INCLUDED IN THIS SPECIFICATION AND/OR SCHEDULE WILL BE ADDED TO THE CONTRACT AFTER AN APPROVED CHANGE NOTICE HAS BEEN ISSUED BY THE ARCHITECT.

QUALITY: PERSONNEL WHO WILL BE RESPONSIBLE FOR SCHEDULING, ORDERING AND CO-ORDINATION HARDWARE FOR THIS PROJECT SHALL BE AN EXPERIENCED HARDWARE CONSULTANT AND WITH AN EXPERIENCED HARDWARE DISTRIBUTOR BOTH OF WHICH SHALL HAVE A MINIMUM OF FIVE YEARS EXPERIENCE. THE ARCHITECT MAY REQUEST A QUALIFICATION FORM SUBMITTED.

SYMBOLS

RIVETT ARCHITECTURAL HARDWARE LTD. March 13, 2024

FINISHES

B.H.M.A.	CANADIAN	U.S.A.	DESCRIPTION
600	CP	USP	PRIMED FOR PAINT
602	C2C	US2C	CADMIUM PLATED
603	C2G	US2G	ZINC PLATED
605	C3	US3	BRIGHT BRASS CLEAR COATED
606	C4	US4	SATIN BRASS CLEAR COATED
609	C5	US5	SATIN BRASS BLACKENED CLEAR COAT
612	C10	US10	SATIN BRONZE CLEAR COATED
613	C10B	US10B	OXIDIZED SATIN BRONZE OIL RUBBED
619	C15	US15	SATIN NICKEL PLATED CLEAR COATED
625	C26	US26	BRIGHT CHROMIUM PLATED
626	C26D	US26D	SATIN CHROMIUM PLATED
627	C27	US27	SATIN ALUMINUM CLEAR COATED
628	C28	US28	SATIN ALUMINUM CLEAR ANODIZED
629	C32	US32	BRIGHT STAINLESS STEEL
630	C32D	US32D	SATIN STAINLESS STEEL
689	SBL	USP28	ALUMINUM PAINT
690	DBL	USP20	DARK BRONZE PAINT
691	ES, SB		BRONZE LACQUER
692	TAN		TAN LACQUER
693	KPD, BLACK		BLACK LACQUER
696	EAB, SB		SATIN BRASS LACQUER

HANDING

LH	LEFT HAND	LHA	LEFT HAND ACTIVE
RH	RIGHT HAND	RHA	RIGHT HAND ACTIVE
LHR	LEFT HAND REVERSE	LHRA	LEFT HAND REVERSE ACTIVE
RHR	RIGHT HAND REVERSE	RHRA	RIGHT HAND REVERSE ACTIVE

WORDS

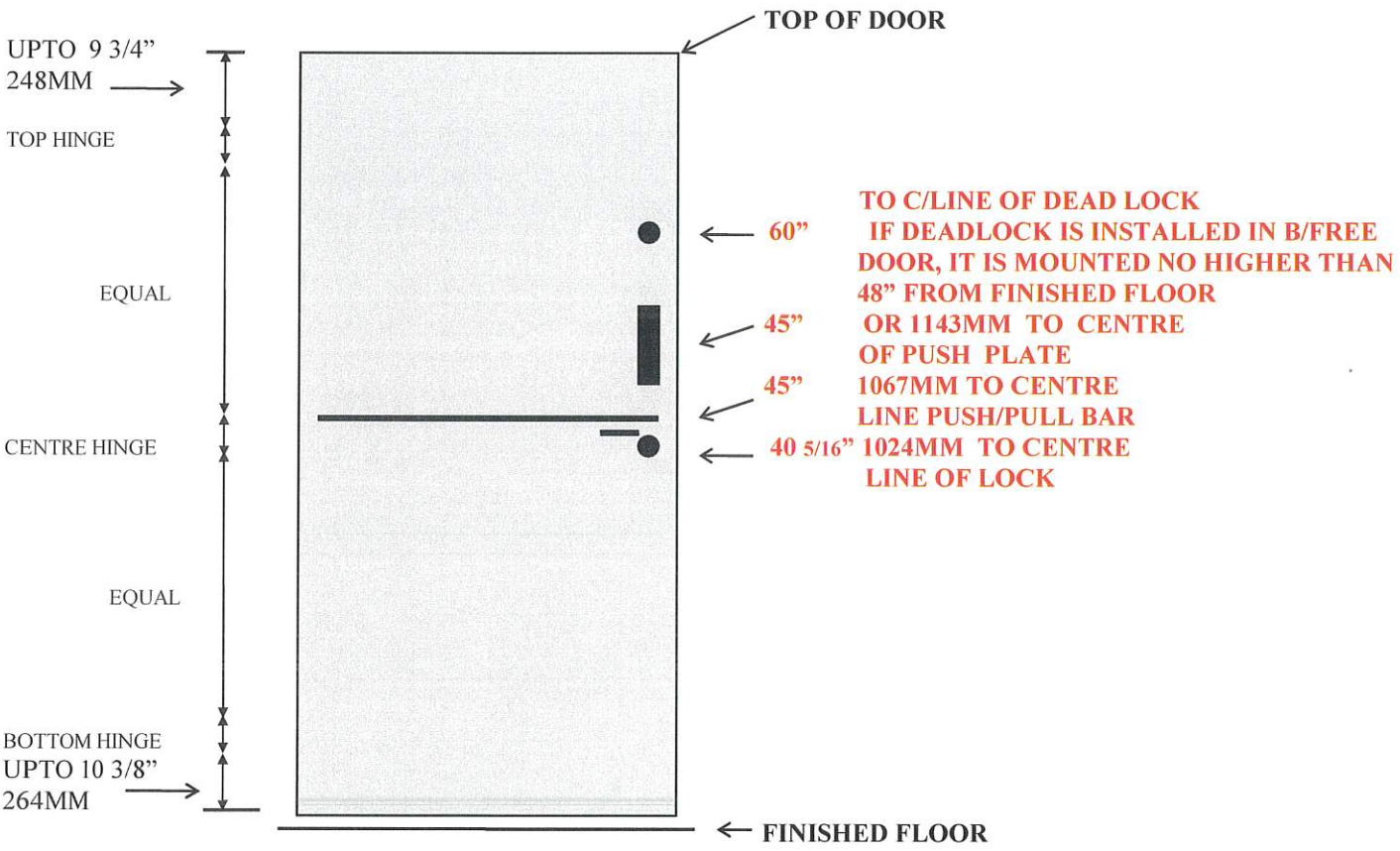
ALUM	ALUMINUM	NRP	NON REMOVABLE PIN
ASA	ASA STRIKE	PR	PAIR
BS	BACKSET	SEC	SECTION
CC	CANCELED	SGLE	SINGLE
CYL	CYLINDER	STD	STANDARD
DA	DOUBLE ACTING	TB	THRU BOLTS
DS	DEAD STOP	ULA	UNDERWRITERS LABELED 3 HOUR RATED
EA	EACH	ULB	UNDERWRITERS LABELED 1 1/2 HOUR RATED
ELEV	ELEVATION	ULC	UNDERWRITERS LABELED 3/4 HOUR RATED
HDWE	HARDWARE	ULD	UNDERWRITERS LABELED 1/3 HOUR RATED
HO	HOLD OPEN	UL	UNDERWRITERS FIRE LABELED
MM	MILLIMETERS	161	STANDARD CYLINDER LOCK CUTOUT

DOORS & FRAMES

FS	FRAME SINGLE "KD"	FD	FRAME DOUBLE "KD"
FSW	FRAME SINGLE WELDED	FDW	FRAME DOUBLE WELDED
FSWTH	FRAME SINGLE WELDED THERMO	FDWTB	FRAME DOUBLE WELDED THERMO
FSTB	FRAME SINGLE THERMO "KD"	FDWDE	FRAME WELDED DOUBLE EGRESS
FSDW	FRAME SINGLE DRYWALL	FDWCS	FRAME WELDED CONTRA SWING
FSDWW	FRAME SGLE DRYWALL WELDED	FDDW	FRAME DOUBLE DRYWALL "KD"
D	DOOR "D" SERIES HONEYCOMB CORE	-14	14 GAUGE STEEL DOOR OR FRAME
H	DOOR "H" SERIES STEEL STIFFENED	-16	16 GAUGE STEEL DOOR OR FRAME
E	DOOR "E" SERIES EMBOSSED	-18	18 GAUGE STEEL DOOR OR FRAME
		-20	20 GAUGE STEEL DOOR OR FRAME
M	FLUSH FACE DOOR	PSF	PRESSED STEEL FRAME
G	HALF LITED DOOR	WF	WOOD FRAME
NL	NARROW LITED DOOR	HMD	HOLLOW METAL DOOR
L	LOUVERED DOOR	HCWD	HOLLOW CORE WOOD DOOR
2G	TWO LITED DOOR	SCWD	SOLID CORE WOOD DOOR
V	VIEW LITED DOOR	PLAM	PLASTIC LAMINATED DOOR
KD	KNOCK DOWN	PSF	PRESSED STEEL FRAME
TRR	TEMPERATURE RISE RATED	CIF	CHANNEL IRON FRAME
STC	SOUND TRANSMISSION	DR	DOOR

HARDWARE LOCATION DIAGRAM

RIVETT ARCHITECTURAL HARDWARE LTD. March 13, 2024



ALL HARDWARE MOUNTING LOCATIONS SHALL BE AS PER LOCATIONS DIAGRAM AND HELD CONSISTENT THROUGHOUT THE PROJECT, UNLESS INDICATED ELSEWHERE IN THE ARCHITECTS DRAWINGS, FINISHING HARDWARE SCHEDULE OR AS DIRECTED BY

GENERAL CONTRACTOR TO VERIFY BLOCKING IS INSTALLED IN DRYWALL STUD PARTITIONS WHERE WALL STOPS ARE SPECIFIED

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Door Listing

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule 91043
Date Mar 13-24

Door Number	Set Number
101	3
102	4
103	4
104	5
105	6
106	7
107	6
108	8
108A	9
109	8
109A	9
110	8
110A	9
111	8
112	8
113	8
114	8
114-1	16
114-2	16
114-3	16
115	12
116	12
117	12
118	12
119	12
120	12
121	13
121B	18
122	13
123	6
125	14
C4A	15
H4	20
H5A	17
H5B	18
H9A	17
H9B	18
V1A	1

V1B	2
V2A	1
V2B	2
V3A	10
V3B	11
V4A	10
V4B	11
V4C	11

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **1**

1 PAIR OF DRS # V1A EXTERIOR FROM VESTIBULE V1 LHR/RHR
1 PAIR OF DRS # V2A EXTERIOR FROM VESTIBULE V2 LHR/RHR

2 - PAIR OF 1016 x 2150 x 45 x HMD x PSF
removable h/metal mullion by frame supplier

	Qty			
: :	12	EA	HINGE	BB1199-114 X 101-NRP- 630
: :	4	EA	PANIC DEVICE	98EO X 628
: :	4	EA	DOOR PULL	12L X 12" X 630
: :	2	EA	RIM CYLINDER	34 X 626
			install on active door of each pair. Confirm school keyway	
: :	2	EA	DOOR OPERATOR	SW200i X SINGLE HSG X 628
			110v to head of frame by EC. Architect to confirm which door has PDO	
: :	4	EA	WALL MOUNT SWITCH	#6R-3 X H/C PUSH X 630
			low voltage and single gang junction boxes by EC	
: :	2	EA	ELECTRIC STRIKE	9600 X 630
			low voltage to run down mullion by frame supplier	
: :	2	EA	LABOUR CHARGE	LABOUR - INSTALL OPER. & E/ST
: :	2	EA	CLOSER	4040XP X 689
: :	4	EA	KICKPLATE	190S X 152 X 963 X 630
: :	4	EA	THRESHOLDS	CT-65 X 4'-0" X 628
			check site conditions before ordering specified threshold (TYPICAL)	
: :	4	EA	WEATHERSTRIPPING	W17N X 18'-0" X 628
: :	4	EA	SWEEP	W13S X 4'-0" X 628
: :	2	EA	CARD READERS	BY SECURITY

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **2**

1 PAIR OF DRS # V1B VESTIBULE V1 FROM CORRIDOR 1 — LHR/RHR
1 PAIR OF DRS # V2B VESTIBULE V2 FROM CORRIDOR 2 — LHR/RHR

2 - PAIR OF 1006 x 2150 x 45 x HMD x PSF
removable hollow metal mullion by frame supplier

	Qty			
: :	12	EA	HINGE	BB1168-114 X 101- 626
: :	4	EA	DOOR PULL	12L X 12" X 630
: :	4	EA	DUMMY PUSH PAD	350 X 628
: :	2	EA	DOOR OPERATOR	SW200i X SINGLE HSG X 628
			110v to head of frame by EC. Architect to confirm which door has PDO	
: :	4	EA	WALL MOUNT SWITCH	#6R-3 X H/C PUSH X 630
			single gang junction boxes and low voltage wiriing by EC.	
: :	2	EA	CLOSER	4040XP X 689
: :	8	EA	KICKPLATE	190S X 152 X 963 X 630
			install on both sides of each door	
: :	2	EA	LABOUR CHARGE	LABOUR - INSTALL OPERATOR

Set # **3**

1 SINGLE DR # 101 CORRIDOR 3 TO UTILITY RM 101 — RH

1 - 965 x 2150 x 45 x HMD x PSF x 45min

	Qty			
: :	3	EA	HINGE	BB1168-114 X 101- 626
: :	1	EA	STOREROOM LOCKSET	28 X 10XG04 X LL X 626
: :	1	EA	CLOSER	4040XP X 689
: :	1	EA	KICKPLATE	190S X 152 X 914 X 630
: :	1	EA	WALL STOP	232W X 626

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **4**

1 SINGLE DR # 102 EXIST CORRIDOR H9 TO WC 102 RH
1 SINGLE DR # 103 EXIST CORRIDOR H9 TO WC 103 RH

2 - 880 x 2150 x 45 x PLAM WD DR x PSF

	Qty		
: :	6 EA	HINGE	BB1279-114 X 101- 626
: :	2 EA	PRIVACY SET	28 X 10XU65 X LL X 626
: :	2 EA	CLOSER	4040XP X 689
: :	2 EA	KICKPLATE	190S X 152 X 829 X 630
: :	2 EA	WALL STOP	232W X 626

Set # **5**

1 SINGLE DR # 104 CORRIDOR 2 TO UNIVERSAL WC 104 LH

1 - 965 x 2150 x 45 x PLAM WD DR x PSF

	Qty		
: :	3 EA	HINGE	BB1168-114 X 101- 626
: :	1 EA	STOREROOM LOCKSET	28 X 10XG04 X LL X 626
: :	1 EA	ELECTRIC STRIKE	1600CLB X 630
		low voltage wiring to strike by EC	
: :	1 EA	DOOR OPERATOR	SW200i X SINGLE HSG X 628
		110v to head of frame by EC	
: :	1 EA	DOOR OPERATOR ADD ON	SW200i ADD FOR INSWING ARM
: :	1 EA	OCCUPIED & EMERGENCY KIT RECES	#OCC-1-EMR-R KIT
: :	1 EA	LABOUR CHARGE (STD BUTTON)	LABOUR - INSTAL OP-OCC1-ES-EMR
: :	1 EA	KICKPLATE	190S X 152 X 914 X 630
: :	1 EA	WALL STOP	232W X 626
: :	1 EA	KEY SWITCH	#CM-170/21 X 630
: :	1 EA	LABOUR CHARGE	LABOUR - INSTALL KEYSWITCH
		low voltage wiring and single gang (narrow box) by EC	

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule 91043
Date Mar 13-24

Set # 6

1 SINGLE DR # 105 CORRIDOR 3 TO STAFF ROOM 105 LH
1 SINGLE DR # 107 CORRIDOR 2 TO PROF COLLAB ROOM 107 RH
1 SINGLE DR # 123 CORRIDOR 2 TO GROUP RM 123 LH

3 - 965 x 2150 x 45 x PLAM WD DR x PSF

Qty		
9 EA	HINGE	BB1168-114 X 101- 626
3 EA	CLASSROOM LOCKSET	28 X 10XG37 X LL X 626
3 EA	SURFACE STOP	904S X 630
3 EA	KICKPLATE	190S X 152 X 914 X 630

Set # 7

1 SINGLE DR # 106 GENERAL PURPOSE RM 124 TO EQUIP STORAGE 106 RH

1 - 965 x 2150 x 45 x PLAM WD DR x PSF

Qty		
3 EA	HINGE	BB1168-114 X 101- 626
1 EA	STOREROOM LOCKSET	28 X 10XG04 X LL X 626
1 EA	KICKPLATE	190S X 152 X 914 X 630
1 EA	WALL STOP	232W X 626

Set # 8

1 SINGLE DR # 108 CORRIDOR 1 TO KINDERGARTEN 108 RH
1 SINGLE DR # 109 CORRIDOR 2 TO KINDERGARTEN 109 RH
1 SINGLE DR # 110 CORRIDOR 2 TO KINDERGARTEN 110 LH
1 SINGLE DR # 111 CORRIDOR 2 TO CLASSROOM 111 RH
1 SINGLE DR # 112 CORRIDOR 2 TO CLASSROOM 112 LH
1 SINGLE DR # 113 CORRIDOR 2 TO CLASSROOM 113 LH
1 SINGLE DR # 114 CORRIDOR 4 TO CLASSROOM 114 RH

7 - 965 x 2150 x 45 x PLAM WD DR x PSF

Qty		
21 EA	HINGE	BB1168-114 X 101- 626
7 EA	OFFICE LOCKSET	28 X 10XG05 X LL X 626
7 EA	SURFACE STOP	904S X 630
7 EA	KICKPLATE	190S X 152 X 914 X 630

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **9**

1 SINGLE DR # 108A KINDERGARTEN 108 TO WC 108A — LH
1 SINGLE DR # 109A KINDERGARTEN 109 TO WC 109A — LH
1 SINGLE DR # 110A KINDERGARTEN 110 TO WC 110A — RH

3 - 880 x 2150 x 45 x PLAM WD DR x PSF

	Qty		
: :	9	EA HINGE	BB1168-114 X 101- 626
: :	3	EA LATCHSET	28 X 10XU15 X LL X 626
: :	3	EA KICKPLATE	190S X 152 X 829 X 630
: :	3	EA WALL STOP	236W X 626

Set # **10**

1 SINGLE DR # V3A EXTERIOR FROM KINDERGARTEN VEST V3 — LHR
1 SINGLE DR # V4A EXTERIOR FROM KINDERGARTEN VEST V4 — LHR

2 - 1016 x 2150 x 45 x HMD x PSF

	Qty		
: :	6	EA HINGE	BB1199-114 X 101-NRP- 630
: :	2	EA PANIC DEVICE	98EO X 628
: :	2	EA DOOR PULL	12L X 12" X 628
: :	2	EA CLOSER	4040XP X 689
: :	2	EA KICKPLATE	190S X 152 X 963 X 630
: :	2	EA WEATHERSTRIPPING	W17N X 18'-0" X 628
: :	2	EA THRESHOLDS	CT-32 X 4'-0" X 628
		check site conditions before ordering specified thresholds	
: :	2	EA SWEEP	W13S X 4'-0" X 628

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **11**

1 SINGLE DR # V3B KINDERGARTEN VEST V3 FROM KINDERGARTEN 108 LHR
1 SINGLE DR # V4B KINDERGARTEN VEST V4 FROM KINDERGARTEN 109 LHR
1 SINGLE DR # V4C KINDERGARTEN VEST V4 FROM KINDERGARTEN 110 RHR

3 - 965 x 2150 x 45 x HMD x PSF

	Qty		
: :	9 EA	HINGE	BB1168-114 X 101- 626
: :	3 EA	PUSH PLATE	30S X 101 X 406 X 630
: :	3 EA	DOOR PULL	12L X 12" X 630
: :	3 EA	CLOSER	4040XP X 689
: :	6 EA	KICKPLATE	190S X 152 X 914 X 630
		install on both sides of each door	
: :	3 EA	WALL STOP	232W X 626

Set # **12**

1 SINGLE DR # 115 CORRIDOR 4 TO WC 115 LH
1 SINGLE DR # 116 CORRIDOR 4 TO WC 116 LH
1 SINGLE DR # 117 CORRIDOR 4 TO WC 117 LH
1 SINGLE DR # 118 CORRIDOR 4 TO WC 118 LH
1 SINGLE DR # 119 CORRIDOR 4 TO WC 119 LH
1 SINGLE DR # 120 CORRIDOR 4 TO WC 120 LH

6 - 880 x 2150 x 45 x PLAM WD DR x PSF

	Qty		
: :	18 EA	HINGE	BB1168-114 X 101- 626
: :	6 EA	OFFICE LOCKSET	28 X 10XG24 X LL X 626
: :	6 EA	SURFACE STOP	904S X 630
: :	6 EA	KICKPLATE	190S X 152 X 829 X 630

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **13**

1 SINGLE DR # 121 CORRIDOR 3 TO SENSORY RM 121 LH
1 SINGLE DR # 122 CORRIDOR 3 TO SENSORY RM 122 RH

2 - 965 x 2150 x 45 x PLAM WD DRS x PSF

	Qty		
: :	6 EA	HINGE	BB1168-114 X 101- 626
: :	2 EA	LATCHSET	28 X 10XU15 X LL X 626
: :	2 EA	SURFACE STOP	904S X 630
: :	2 EA	KICKPLATE	190S X 152 X 914 X 630

Set # **14**

1 SINGLE DR # 125 EXTERIOR FROM SPRINKLER RM 125 RHR

1 - 1016 x 2150 x 45 x HMD x PSF

	Qty		
: :	3 EA	HINGE	BB1191-114 X 101-NRP- 630
: :	1 EA	STOREROOM LOCKSET	28 X 10XG04 X LL X 626
: :	1 EA	LATCH PROTECTOR - 6 INCH	CLP-106 X 630 LATCH PROTECTOR
: :	1 EA	CLOSER	4040XP X 689
: :	1 EA	WEATHERSTRIPPING	W17N X 18'-0" X 628
: :	1 EA	THRESHOLDS	CT-12 X 4'-0" X 628
		check site conditions before ordering specified threshold	
: :	1 EA	SWEEP	W13S X 4'-0" X 628

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **15**

1 PAIR OF DRS # C4A EXIST CORRIDOR H5 TO/FROM CORRIDOR 4 — LHR/RH

1 - PAIR OF 960 x 2150 x 45 x HMD x PSF x 45min
confirm sizes

	Qty			
: :	6	EA	HINGE	BB1168-114 X 101- 626
: :	2	EA	PANIC DEVICE	9827EO-F X LBR X 628
: :	2	EA	SENTRONIC CLOSER	4040SE X 24V X 689
			24v to frame by EC. Hold open door closers are wired to fire alarm panel. Will automatically shut when power goes out. When power comes back on, doors must me manually opened to set hold open point.	
: :	4	EA	KICKPLATE	190S X 152 X 914 X 630
: :	2	EA	WALL STOP	232W X 626

Set # **16**

1 SINGLE DR # 114-1 EXIST CORRIDOR H4 FROM EXIST CL/ROOM 114-1 — RHR
1 SINGLE DR # 114-2 CORRIDOR 3 FROM EXIST CL/ROOM 114-2 — RHR
1 SINGLE DR # 114-3 EXIST CORRIDOR H5 FROM EXIST CL/ROOM 114-3 — LHR

3 - 965 x 2150 x 45 x PLAM WD DR x PSF x 45min

	Qty			
: :	9	EA	HINGE	BB1168-114 X 101-NRP-626
: :	3	EA	OFFICE LOCKSET	28 X 10XG05 X LL X 626
: :	3	EA	CLOSER	4040XP X 689
: :	3	EA	KICKPLATE	190S X 152 X 914 X 630

Set # **17**

1 SINGLE DR # H5A EXIST CORRIDOR FROM CORRIDOR 4 — LHR
1 SINGLE DR # H9A EXIST CORRIDOR FROM H4 FROM CORRIDOR H9 — RHR

2 - 965 x 2150 x 45 x TEMP/HMD x TEMP/PSF
(temp doors are to existing kindergarten rooms)

	Qty			
: :	6	EA	HINGE	BB1168-114 X 101- 626
: :	2	EA	OFFICE LOCKSET	28 X 10XG05 X LL X 626
: :	2	EA	SURFACE STOP	904S X 630
: :	2	EA	KICKPLATE	190S X 152 X 914 X 630

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **18**

1 SINGLE DR # H5B EXTERIOR FROM TEMPORARY CORR — RHR
1 SINGLE DR # H9B EXTERIOR FROM TEMPORARY CORR — RHR
1 SINGLE DR # 121B EXTERIOR FROM EXIST KINDERGARTEN 121 — RHR

3 - 965 x 2150 x 45 x TEMP/HMD x TEMP/PSF

	Qty		
: :	9	EA HINGE	BB1191-114 X 101-NRP- 630
: :	3	EA PANIC DEVICE	98EO X 628
: :	3	EA CLOSER	4040XP X 689
: :	3	EA WEATHERSTRIPPING	W17N X 17'-2" X 628
: :	3	EA THRESHOLDS	CT-10 X 4-0" X 628
: :	3	EA SWEEP	W13S X 4'-0" X 628
: :	3	EA RIM CYLINDER	34 X 626
: :	3	EA DOOR PULL	12L X 12" X 630

Set # **19**

1 SINGLE DR # 122 TEMP CORR FROM EXIST KINDERGARTEN 122 — LHR
1 SINGLE DR # 115 TEMP CORR FROM EXIST KINDERGARTEN 115 — LHR

2 - 965 x 2150 x 45 x TEMP/HMD x TEMP/PSF

	Qty		
: :	6	EA HINGE	BB1168-114 X 101- 626
: :	2	EA OFFICE LOCKSET	28 X 10XG05 X LL X 626
: :	2	EA CLOSER	4040XP X 689
: :	2	EA WALL STOP	232W X 626

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Hardware Schedule

MURRAY CENTENNIAL PS (2024) - TRENTON, ONTARIO

Schedule **91043**
Date **Mar 13-24**

Set # **20**

1 PAIR OF DRS # H4 EXIST CORR H9 TO/FROM EXIST CORR H4 LHR/RH

1 - PAIR OF 960 x 2150 x 45 x HMD x PSF x 90min
confirm sizes

		Qty		
:	:	6 EA	HINGE	BB1168-114 X 101- 626
:	:	2 EA	PANIC DEVICE	9827EO-F X LBR X 628
:	:	2 EA	SENTRONIC CLOSER	4040SE X 24V X 689
			24v to head of frame by EC. Hold open door closers are wiried to fire alarm panel. Doors will automaticaly shut when power goes out. When power comes back on, doors must be manually pused open to the set hold open point.	
:	:	4 EA	KICKPLATE	190S X 152 X 914 X 630
			install on both sides of each door	
:	:	2 EA	WALL STOP	232W X 626

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Joint Sealants	Section 07 92 00
.2	Hollow Metal Doors and Frames	Section 08 11 13
.3	Wood Doors	Section 08 14 00
.4	Aluminum Windows and Doors	Section 08 51 13
.5	Mirrors	Section 08 83 00

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB):

.1	CAN/CGSB-12.1	Safety Glazing
.2	CAN/CGSB-12.3	Flat, Clear Float Glass
.3	CAN/CGSB-12.8	Insulating Glass Units
.4	CAN/CGSB-12.9	Spandrel Glass
.5	CAN/CGSB-12.10	Glass, Light and Heat Reflecting
.6	CAN/CGSB-12.20	Structural Design of Glass for Buildings

.2 Underwriter's Laboratory Canada (ULC)

.1	CAN4-S104	Standard Method for Fire Tests of Door Assemblies
.2	CAN4-S106	Standard Method for Fire Tests of Window and Glass Block Assemblies
.3	CAN/ULC-S101	Fire Endurance Tests of Building Construction and Materials

.3 American Society for Testing and Materials (ASTM):

.1	ASTM E2190	Insulating Glass Unit Performance and Evaluation

.4 Glass Association of North America.

.1 GANA Glazing Manual

.2 GANA Sealant Manual

1.3 QUALITY ASSURANCE

.1 Coordinate with manufacturer of fire rated doors, frames and screens to ensure that the fire glass provided for the work is an acceptable component of their tested assemblies, and can be included as part of their labelled products.

.2 Review drawings for fire separations and ensure fire glass is provided in all rated fire separations, including doors and screen. Inform Consultant of any discrepancies in drawings or schedules.

.3 Glass in **(clerestory windows)** shall be heat-strengthened laminated safety glass, in accordance with MMAH Supplementary Standard SB-3, Glass in Guards. The thickness of the safety glass shall be as required for the size of the glazing units required; refer to drawings for sizing of openings in windows, and screens.

.4 Fabricators:
.1 Fabricator of insulating glazing units shall be capable of providing the IGU's as specified, in sizes required.
.2 It is the responsibility of the Contractor to confirm that the window subcontractor has confirmed the ability of the fabricator to provide the specified units at the time of tender.
.3 Oldcastle Building Envelope, Prelco Inc., Saand, and Truelite are approved fabricators.

.5 Performance for exterior glazed assemblies shall be as specified for windows in Section 08 51 13.

1.4 **SUBMITTALS**

.1 Submit manufacturer's product data for double glazed insulating units. Include performance data for each type of unit required.

.2 Submit manufacturer's product data sheets for fire rated glass.

.3 Submit colour charts for ceramic frit for spandrel panels, for preliminary colour selections.

.4 Samples:

.1 Submit sample of standard double glazed unit.

.2 Submit duplicate samples of coloured spandrel glass for selection of final colour by the Consultant. Samples of approximately four different shades of colour will be required, based on each colour requested by the Consultant.

1.5 **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 Warranty all fire rated glass to be free from defects in workmanship and materials of any kind for a period of **five (5) years**.

.3 Replace (including removal and installation) all glass found to be defective.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Standard Glass:
.1 annealed glass, conforming to CAN/CGSB-12.3
.2 6mm thick unless specified or indicated otherwise.

.2 Tempered Glass: clear tempered glass conforming to CAN/CGSB 12.1; 6mm thick unless otherwise specified

.3 Laminated Glass:
- .1 clear laminated glass conforming to CAN/CGSB 12.1.
- .2 Minimum 3 mm glass, 0.76mm PVB lamination, 3 mm glass.
- .3 Provide thicker laminated glass where required to suit oversized glazing units.

.4 Heat-strengthened Laminated Safety Glass:
- .1 Minimum 3 mm heat-strengthened glass, 1.5mm PVB lamination, 3 mm heat-strengthened glass, conforming to CAN/CGSB 12.1.
- .2 Provide thicker heat-strengthened laminated glass where required to suit larger glazing units.
- .3 Prel-Lam by Prelco, or equivalent by one of the approved fabricators listed above.

.5 Insulating Glass Units (IGU):
- .1 Conform to CAN/CGSB 12.8, Low E units.
- .2 Framed glazing with insulating glass units shall conform to the performance requirements of MMAH Supplementary Standard SB-10 for the climate zone; refer also to Section 08 51 13.
- .3 All exterior glazing shall consist of double glazed, hermetically sealed units composed of 6mm clear, tempered, Low E outer pane, 13mm argon gas filled (min. 90%) space, minimum 6mm clear inner pane.
  - .1 Low E coating to be Vitro Solarban 60, Guardian SN 68, Cardinal LoE^2-272 or AGC Energy Select 40; clear, solar control, Low E (soft/sputtered coat) on inner surface of outer pane (surface #2).
  - .2 Inner pane shall be 6mm clear tempered glass where not otherwise noted.

.6 Spandrel Glass:
- .1 Conforming to CAN/CGSB-12.9, minimum 6mm thick tempered glass with ceramic frit, safety film backed.
- .2 Ceramic frit coating shall be Prel-Coat by Prelco.
- .3 Confirm colour with Consultant; for pricing purposes, assume colour will be Evergreen PC-9902.
- .4 Provide all spandrel glass required for the entire project, to ensure colour consistency.

.7 Fire Rated Glass
- .1 Fire protection rated, impact resistant, laminated clear glass ceramic; in all frames and doors where fire rated separations are required:
  - .1 “FireLite Plus” by Technical Glass Products, “Pyran Platinum L” by Schott North America, or “Keralite Select L” by Vetrotech Saint-Gobain.
- .2 Fire rated glass must bear a permanent label acceptable to local Authorities Having Jurisdiction.
- .3 Coordinate with manufacturer of hollow metal products to ensure the glass provided is an acceptable component in their labelled doors and frames.

.8 Glazing accessories:

.1 Setting Blocks: Neoprene, 80 durometer hardness, 102mm x 6mm width to suit glass, to extend from the fixed stop to the opposite face of the glazing.

.2 Spacer Blocks: Neoprene, thickness to provide minimum glass to face clearance of 3mm

.3 Glazing Compounds:

.1	Tapes:	Pre-formed polyisobutylene- butyl glazing tape with integral shim strip, 10-15 durometer hardness, paper release, black; Tremco "Polyshim" or equal by Dow Corning or General Electric.
.2	Gasket:	Black neoprene "U" cavity type with lock strip.
.3	Sealant:	One component silicone; Spectrum 2 by Tremco or Dow Corning 795, or SCS2000 SilPruf by General Electric.

.4 Acoustic Sealant: Tremco Acoustical Sealant

.5 For fire protection rated applications, all glazing accessories at fire rated glass shall be as specified in the cUL or ULC tested assemblies for the specific glass type.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Examine framing, with glazier present, for compliance with the following:
- .1 Manufacturing and installation tolerances, including size, squareness, offsets at corners.
- .2 Minimum required face or edge clearances.
- .3 Edge damage or face imperfections.

.2 Do not proceed with glazing until unsatisfactory conditions have been corrected.

.3 Clean frames immediately before glazing. Remove any coatings not firmly bonded to substrates.

3.2 SITE CUTTING OF GLASS

.1 Site cutting of glass is prohibited except with the express permission of the Consultant after review of the Contractor's proposed methods.

3.3 INSTALLATION

.1 Conform to the recommendations of the Glass Association of North America (GANA) Glazing Manual, most recent edition.

.2 Inspect glass as installation proceeds. Discard any glass edge damage that could affect performance. Discard any glass with visible defects.

.3 Protect edges of glass from damage during handling and installation.

.4 Cut patterned glass so that pattern is parallel.

.5 Set lights on setting blocks placed at quarter points. Glaze lights with glazing tape or dry gasket glazing system, channel shape to wrap completely around glass edge, or other approved means to prevent rattle.

.6 Replace loose stops in their original positions, set all screws tight, countersink all nails.

3.4 **INTERIOR GLAZING (DRY METHOD)**

.1 Glaze interior hollow metal doors and screens as follows:
- .1 Fire-rated applications to be glazed as specified below.
- .2 Glazing of doors and screens where acoustic glazing is scheduled, shall be sound insulating glazing, as specified above.
- .3 All other hollow metal work to be glazed with tempered glass, unless noted otherwise on door schedule.

.2 Apply glazing tape to permanent stop; use tape of thicknesses to suit installation, projecting 1.6mm above sight line.

.3 Place setting blocks at 1/4 points and not less than 150mm from edges of glass. Remove protective paper from tape immediately prior to placing glass. Centre glass in opening and set on setting blocks. Press glass firmly against tape.

.4 Apply glazing tape to perimeter of glass. Install removable stop, taking care not to dispace tape. Press firmly to ensure continuous contact with glazing.

.5 At acoustic glazing, provide acoustic sealant at full perimeter of glass at fixed stop before installing removable stop.

.6 Finish to neat appearance by trimming tape above sightline.

3.5 **FIRE RATED GLAZING**

.1 Install impact resistant fire glass in all rated doors, frames, and screens.

.2 Neither products incorporating applied safety film, nor wired glass products will be permitted; use specified products only.

.3 Install fire rated glass so that the appropriate rating marking remains permanently exposed.

.4 Install fire rated glass vertically into fire rated frames. Glass and frames shall be of equivalent fire separation rating.

.5 Installation shall be in accordance with tested assemblies; ULC or cUL, or equivalent acceptable to authorities having jurisdiction.

.6 Apply glazing tape to stops, using tape of thickness to suit installation, flush with site lines, with stretch allowance considered.

.7 Centre glass in opening and set on setting blocks located at quarter points of glass but no more than 150mm from corners.

.8 Install glass, glazing tape and removable stops.

3.6 **EXTERIOR GLAZING (WET/DRY METHOD)**

.1 Glaze exterior hollow metal doors and screens as follows:
- .1 All exterior glazing shall be sealed units as specified in 2.1, above.

.2 Provide tempered laminated safety laminated glass in interior pane of all IGU's in:
.1 exterior doors, transoms, and sidelights, and
.2 windows.

.2 Apply glazing tape to fixed leg of frame accurately, cutting and butting joints at corners.

.3 Run a heal bead of sealant 100mm up and 100mm along frame at corners of glass rebate, thick enough to make contact with glass, lapping tape and frame to ensure weathertight seal.

.4 Apply setting blocks at 1/4 points and not less than 150mm from edges of glass. Remove protective paper cover from tape immediately before placing glass. Set glass in on setting blocks and press firmly in place against the glazing tape. Apply spacer shims to edges of glass maximum 600mm apart and more than 150mm from corners.

.5 Install backer rod in voids below glass edge and apply continuous interior heel bead of sealant, making contact with glass edge and metal frame.

.6 Install interior stop, with spacer strips or gasket between glazing and stops, 6mm below site line.

.7 Apply sealant to fill void between glass and stops, finishing in a neat, smooth, even line, bevelled approximately 1.5mm onto glass.

.8 Install insulating units in all exterior screens and doors.

3.7 **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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Brick/block vents	Section 04 05 23
.2	Joint Sealants	Section 07 92 00

1.2 REFERENCES

.1 Air Movement and Control Association International, Inc.
- .1 ANSI/AMCA 500-L Laboratory Methods of Testing Louvers for Rating
- .2 AMCA Publication 501 Louver Application Manual and Design Guide

.2 The Aluminum Association
- .1 Aluminum Standards and Data
- .2 Aluminum Design Manual

.3 American Society of Civil Engineers
- .1 Minimum Design Loads and Associated Criteria for Buildings and Other Structures

.4 ASTM International

.1	ASTM B209	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
.2	ASTM B211	Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
.3	ASTM B221	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
.4	ASTM E90	Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.3 DESIGN

.1 Design all members to withstand within acceptable deflection limitations their own weight, and the minimum design loads due to the pressure and suction of wind as calculated in accordance with the Building Code of Ontario, based on 30 year probability.

.2 Deflection limits for all members - a maximum of 1/175 of the span under design loading. Submit wind load calculations to the Consultant for approval before commencing fabrication.

.3 Design louvres to meet requirements indicated on Mechanical Drawings for net area, and percentage of free air.

1.4 SUBMITTALS

.1 Provide shop drawings clearly indicating the material being supplied and showing all connections, attachments, reinforcing, anchorage and location or exposed fasteners.
- .1 Provide information referencing mechanical drawings for net area, and percent of free air.

.2 Provide product test reports based on tests performed in accordance with AMCA 500-L.

.3 Provide installation information and details.

.4 Submit samples of finish to the Consultant for approval prior to fabrication.

1.5 **DELIVERY, STORAGE AND HANDLING**

.1 Delivery:
- .1 Deliver materials to site in manufacturer's original, closed containers sealed packaging, with labels clearly indicating the name of the manufacturer and the type of the material.

.2 Storage:
- .1 Store materials indoors in a dry place to be protected against any means of damage.
- .2 If stored outside for any reason, materials must be covered with weather proof, flame resistant, sheeting or tarpaulin.

.3 Handling:
- .1 Handle materials as recommended by the manufacturer to prevent damage. Don not lift louvres by the heads, sills and blades, as this will result in damage. Lift and carry louvre sections only by the jambs.

1.6 **WARRANTY**

.1 Warrant louvres for **two (2) years** against defective materials and workmanship, and finishes for **twenty (20) years**, from date of Substantial Performance of the Contract.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Aluminum louvres to be fixed extruded aluminum horizontal double drainable blade louvres, Model DSP-635 , complete with all necessary accessories, as distributed by McGill Architectural Products.
- .1 Louver Depth: 150 mm
- .2 Blade Profile: Dual Drainable blade with front gutter for water diversion to jambs
- .3 Frame and Blade Nominal Thickness: Not less than 2 mm for blades and frames
- .4 Louver Performance Ratings according to AMCA 500-L standards:
  - .1 Free Area: 55%, not less than 0.81m^2, for 1220mm x 1220mm louver.
  - .2 Free Area Velocity at Beginning Point of Water Penetration: 4.98 m/s (980 fpm).
  - .3 Air Volume Flow Rate at Beginning Point of Water Penetration, 1220 x 1220mm unit: 3.71 m^3/s (7,850.4 cfm)
  - .4 Pressure Drop at Beginning Point of Water Penetration: 38 Pa (0.15" H_2O)
  - .5 Air Performance: Discharge loss coefficient classification: Class 2

.2 Similar louvres by Ten Plus, Ruskin, Greenheck, or Construction Specialities will be accepted as equal.

.3 Finish:
- .1 Louvre finish to be clear anodized aluminum

2.2 **FABRICATION**

.1 Fabricate louvres of extruded aluminum construction. Frame to be channel profile, with corner joints mitred, all welded construction, and with continuous recessed caulking channel each side. Provide intermediate mullions matching frame.

.2 Fabricate louvres with mullions or reinforcing not visible on the outside. Finished appearance shall be that of continuous blades housed in a rectangular frame.

.3 Blades shall be one piece extrusions with reinforcing bosses, supported and lined up with heavy-gage extruded aluminum blade braces, positively interlocked to each blade and mechanically secured to structure with aluminum and stainless steel fastenings.

.4 Provide weep holes at 600mm o.c. for drainage to exterior, and gutters.

.5 Provide all extruded aluminum angles and channels required to frame the louvre elements.

.6 Finished louvres shall be rated fo air performance and water penetration maintained effectiveness rate tested in accordance with AMCA 500-L.

.7 Construct frames and blades of minimum 2.0mm thick extruded aluminum 6063-T5, 152mm depth.

.8 Supply and install 1.6mm diameter wire aluminum bird screen 13mm square mesh. Securely fasten standard screen to louvre frame.

.9 Fabricate the Work of this Section by skilled craftsmen in accordance with the best practice in the shops or companies specializing in the Work specified.

.10 Execute fitting and assembly of louvres in the shop with the various parts or assemblies ready for erection at the Site.

.11 Fabricate the Work true to dimensions, square, plumb and level. Accurately fit joints and intersection members with adequate fasteners.

.12 Fabricate the finished work free from distortion and defects detrimental to appearance and performance.

.13 Weld connections where possible; where not possible, bolt connections or secure in an approved manner. Countersink exposed fastenings and cut off bolts flush with nuts, and make as inconspicuous as possible.

.14 Provide fabricated metal work complete with all components required for anchoring to concrete or masonry. Perform all drilling of concrete necessary to anchor components.

PART 3 - EXECUTION

3.1 GENERAL

.1 Insulate where necessary to prevent electrolysis due to metal to metal contact or contact between metal and masonry or concrete Use bituminous paint, butyl tape, building paper or other approved methods.

.2 Provide all necessary templates and instructions where fastenings or anchors have to be built in by others. Verify all dimension on the Site before preparing drawings or proceeding with shop work.

.3 Supply and build in 1.02mm thick sheet aluminum flashing where required to prevent entry of moisture into building.

3.2 INSTALLATION

.1 Fasten louvre frame to supporting structure plumb, level and true and in accordance with manufacturer's instructions.

.2 Ensure blank offs are provided for unused portions of the louvre area from inside with insulated panels adequately fixed to frames and blades to prevent vibration. Blank off panels to be provided by mechanical trade. Seal joints in metal sheets and between panel and frame; comply with Section 07 92 00.

.3 Blank off panels to be sealed in manner to ensure continuity of the thermal and vapour seal of the building skin.

.4 Perform all drilling of concrete and masonry necessary to anchor components.

.5 After installation, touch up to make good the shop coat of finish.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Preparation of concrete slab to receive new flooring:
- .1 Levelling of slab, including transition of floor levels at changes in finish materials.
- .2 Patching and repairs to slab, as may be required.

.2 Moisture Reduction Barrier (if required only):
- .1 The cost of providing a moisture reduction barrier over concrete slab on grade should not be included in the contract; it will not be required if the moisture vapour reduction admixture (MVRA) has been added to concrete mix, as specified in Section 03 30 00.
- .2 If any concrete used in slab-on-grade is found not to contain the MVRA, then provision of moisture reduction barrier, to reduce moisture vapour transmission through new sections of concrete slab, must be provided at no additional cost to the Owner.
  - .1 Apply to properly prepared sound and stable concrete substrates, at least 7 days old.
  - .2 Apply moisture reduction barrier over all new sections of concrete slab-on-grade scheduled to receive any floor finish.

1.2 RELATED WORK

.1	Concrete, MVRA in slab-on-grade	Section 03 30 00
.2	Ceramic Tiling	Section 09 30 16
.3	Resilient Flooring	Section 09 65 00

1.3 SUBMITTALS

.1 Submit product data sheets, MSDS, and installation instructions for all products.

1.4 STORAGE

.1 Store materials in original containers in a dry area at normal room temperature (approx. 20°C).

PART 2 - MATERIALS

2.1 MATERIALS

.1 Patching Compound:
- .1 Ardifix by Ardex Americas; two-part polyurethane repair compound

.2 Moisture-Reduction Barrier:
- .1 MC Rapid, one-coat moisture control system by Ardex Americas; 100% solids epoxy moisture management system, for suppressing moisture vapour emissions in new concrete.

.3 Levelling Agent:
- .1 K60 Arditex Rapid Setting Latex Smoothing and Levelling Compound by Ardex Americas; Portland cement based, self-smoothing, trowelable, tow component, latex levelling compound.

.4 Equivalent products as manufactured by Mapei or Laticrete will also be considered, subject to proof of equivalent properties and capabilities. Materials must be compatible with each other and with mortars and adhesives used for floor finishes.

PART 3 - EXECUTION

3.1 GENERAL

.1 Confirm environmental requirements with product manufacturer.

.2 All moving joints and moving cracks must be continuous through entire floor system; install flexible compound designed for this purpose.

.3 Flooring preparation work, including moisture control system, must be in place prior to installation of partition walls. Moisture control barrier must be continuous under new partitions and furring.

3.2 EXAMINATION OF WORK IN PLACE

.1 Examine surfaces to receive the work of this Section and proceed only when conditions are satisfactory for a proper installation.

.2 Verify substrate is free of bond-inhibiting or bond-breaking materials such as curing compounds and dust.

.3 Test concrete substrate using a Calcium Chloride Test (ASTM F1869) and concrete moisture probes to measure the relative humidity. Concrete substrate shall be acclimated to 23°C and 50% relative humidity prior to testing.

3.3 SURFACE PREPARATION

.1 Substrate must be structurally sound, dry, solid and stable. Clean surface of dust, dirt, oil, grease, paint, curing compounds, concrete sealers, and any other substances that may prevent or reduce adhesion, by mechanical methods acceptable to the Consultant and the product manufacturer. No chemical etching is permitted.

.2 Mechanically prepare control, construction and expansion joints, and any cracks, with a diamond crack-chasing/ concrete-cutting blade. Overcut the joint width to obtain a sound substrate. Use an industrial type of vacuum to completely remove the dust and contaminants. Use an appropriate attachment with a rubber seal around the suction end of the nozzle for maximum pickup of contaminates and dust.

.3 Patch any damaged areas of concrete floors with patching compound in accordance with manufacturer's printed instructions. Patch concrete before applying moisture reduction barrier.

3.4 INSTALLATION - MOISTURE REDUCTION BARRIER

.1 If presence of moisture vapour reduction admixture (MVRA) in concrete substrate is confirmed by Inspection and Testing Company, then topical moisture reduction barrier is not required. Proceed with the work of this subsection only if the MVRA has been omitted.

.2 Apply moisture reduction barrier in accordance with manufacturers printed instructions. Apply to all new concrete, and to existing concrete to receive new floor finishes.

.3 Apply using application methods and tools prescribed by the manufacturer. Allow 24 hours before re-coating.

.4 Apply product at rate recommended by the manufacturer; assume median of application rate range is required for first application. Apply additional product as required to ensure complete coverage.

.5 Finished application shall cover concrete floors completely, without voids or pinholes.

.6 Allow moisture reduction barrier to cure as recommended by the manufacturer, generally for a minimum of 4 hours and a maximum of 8 hours, prior to installing smoothing and levelling compound.

.7 Expansion and other movement joints must continue through finished floor system.

3.5 **INSTALLATION - LEVELLING COMPOUND**

.1 Apply levelling compound at doorways and other locations where floor finishes of different thicknesses meet, to provide level transition.
   .1 This includes over concrete floors without floor finishes.
   .2 Feather levelling compound out in each direction over lower floor area, so that slope is unnoticeable in finished floor. This would require extending levelling compound out to a distance of over 2.4 metres, for example, where an exposed concrete floor meets a porcelain tiled floor.

.2 Apply levelling compound over moisture reduction barrier, to smooth and level floor prior to application of resilient flooring. Surface must be properly prepared, in accordance with manufacturers requirements.

.3 Protect from excessive heat or drafty conditions during curing period.

.4 Consult manufacturer to confirm when flooring materials may be installed. Do not apply adhesive or flooring before material is completely dry; for ARDEX K 60, cure 16-24 hours at 21°C (70°F) prior to installing finish flooring.

3.6 **CLEANUP**

.1 Fresh, wet materials can be cleaned off with soapy, warm water.

.2 Cured material must be mechanically removed from surfaces.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry	Section 06 10 00
.2	Thermal and acoustic insulation	Section 07 21 00
.3	Vapour Barrier	Section 07 26 00
.4	Steel Doors and Frames	Section 08 11 13
.5	Gypsum Board	Section 09 29 00
.6	Acoustic Ceilings, drywall suspension systems	Section 09 51 00

1.2 REFERENCES

.1 CSA S136 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 ASTM International

.1	A641/A641M	Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
.2	A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.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	C841	Standard Specification for Installation of Interior Lathing and Furring
.8	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
.9	E90	Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
.10	E413	Classification for Rating Sound Insulation
.11	E488	Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
.12	E1190	Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members

.4 Canadian Sheet Steel Building Institute (CSSBI) Technical Bulletins:

.1	Volume 7, Number 1:	Maximum Height Tables for Interior Non-Loadbearing Partitions
.2	Volume 7, Number 3:	Specification of Non-Load Bearing Steel Studs
.3	Volume 7, Number 4:	Applications of Non-Load Bearing Steel Studs
.4	Volume 7, Number 8:	Non-Loadbearing Steel Stud Composite Limiting Height Calculation for Canadian Applications

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, and locations of items to be wall mounted. Provide blocking at appropriate locations behind all wall mounted cabinetry, heavy millwork, washroom accessories, mirrors, equipment, service fittings, fixtures, and other surface mounted items indicated on the drawings.

.2 Co-ordinate with mechanical and electrical trades to accommodate installation of all services and fittings prior to application of wall board or sheathing.

.3 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, as specified below. Equivalent products, where available, will be accepted from Steelform Group, Imperial Group, DCM Metal, or Trebor Building Products. Metal framing shall conform to ASTM C645.

.2 Metal framing shall be fabricated from sheet steel with minimum base thickness of 0.455mm (18 mils), galvanized, and specially designed for application of impact-resistant or abuse-resistant gypsum board. Do not use standard 25 gauge framing for impact-resistant or abuse-resistant gypsum panels; where specialty framing is not available, provide framing with a minimum base thickness of 0.836 mm, (33 mils).

.3 Metal Studs and Track:
- .1 Fabricated from sheet steel, galvanized; depths as indicated on drawings and as required suit wall thicknesses indicated.
- .2 Typical studs and track shall be Bailey B18 Hard Board Stud, minimum 0.455mm (18mils) base metal thickness and 50 ksi (Grade 50) tensile strength, with min. 36.5mm (17/16") flange; required where abuse-resistant or impact-resistant panels, or cement board, are to be applied. Note that typical panels are abuse resistant for this project.
- .3 Where standard gypsum panels are permitted, Bailey Platinum Plus steel framing, minimum 0.455mm (25 ga), is the minimum required for framing.
- .4 Base thickness shall be 0.455mm and 0.836mm, as specified above.
- .5 Conform to manufacturer's maximum height tables for steel studs. For heights in excess of height limitations for 0.455mm steel studs, use studs with base metal thickness of 0.836mm (33 mils).
- .6 Track shall be of same base metal thickness as studs, with minimum 50mm deep flanges. Bottom track shall be single piece. Top track shall be single piece or double track, manufactured to prevent cracking of applied finishes resulting from deflection of structure above.

.4 Metal Furring Channels:
- .1 sheet galvanized steel channel and accessories as manufactured by Bailey Metal Products, or approved alternate; to ASTM C645.
- .2 minimum 0.836 mm, design thickness, (20 ga) steel furring channels required at walls, and where abuse resistant or impact-resistant panels are to be applied.
- .3 minimum 0.455mm (25 ga) required for all other furring channels.
- .4 Hat channels shall be minimum 22mm deep, with minimum 12.7mm flanges.
- .5 Resilient furring channels shall be designed to reduce sound transmission and shall have a minimum depth of 12.7 mm.

.5 Carrying Channels:
- .1 Channels shall conform to ASTM C754 and shall be cold-firmed from steel with minimum 228 MPa yield strength and 1.37 mm base steel thickness.
- .2 Channels shall have a minimum coating of Z120 galvanizing in accordance with ASTM A653/A653M.
- .3 Carrying channels shall have minimum 12.7mm wide flanges and minimum depth of 38mm.

.6 Bracing and Blocking:
- .1 Provide flat straps and backing plates of galvanized sheet steel for blocking and bracing; length and width as required.
- .2 Minimum base steel thickness shall match studs or furring in which it is installed.
- .3 Width of bracing shall match width of studs.
- .4 Width of blocking shall be as required to sustain loading of wall mounted items.

.7 Channel Bridging:
- .1 Channel bridging shall have a minimum base steel thickness of 0.455mm with minimum 12.7 mm wide flanges and minimum depth of 19 mm.

.8 Fasteners for Metal Framing:
- .1 Fasteners to be of type, material, size, corrosion resistance, strength, and holding power, as required to fasten steel members to substrates in accordance with ASTM C1002.

.9 Hanger wire: minimum 3.77mm (9ga) galvanized steel wire.

.10 Tie Wire: minimum 1.5mm (16 ga) galvanized, soft annealed, steel wire.

.11 Screws: CGC Brand Screws (or approved equal) of type recommended by the board manufacturer.

.12 Ceiling Anchors: Self drilling tie wire anchors, Phillips "Red Head" T-32 or approved equal.

.13 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.

.14 Dampproofing & Moisture Mitigation: 6.3mm thick closed cell polyethylene foam strip, by width of bottom track and self adhering air vapour barrier.

.15 Acoustic sealant is specified in Section 09 29 00.

.16 Note that where fire rated assemblies are required, the materials shall be of the types used in the fire test and listed on the tested design documentation.

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.

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 400mm 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 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.

.7 Proprietary drywall suspension systems as specified in Section 09 51 00 will also be accepted for framing of gypsum board ceilings.

3.3 **BLOCKING**

.1 Provide blocking around openings, including infill partitions above openings in masonry walls, etc.

.2 Provide blocking for attachment support of all wall mounted or ceiling mounted equipment, fixtures, casework, and furnishings. Confirm blocking requirements with forces installing such items.

.3 Blocking is required in particular for all whiteboards, tackboard, millwork on gypsum board partitions.

.4 Provide heavier gauge straps or sheet steel as required for support of large or heavy objects.

3.4 **EXTERIOR SOFFITS**

.1 Frame all exterior soffits with 20 ga steel stud framing, anchored and braced to masonry walls and/or floor slabs.

.2 Cooperate with forces installing plywood sub-soffit, vapour barrier, insulation, and cement board at insulated soffits.

.3 Cooperate with forces installing fibre reinforced concrete panels at soffits.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry	Section 06 10 00
.2	Insulation	Section 07 21 00
.3	Steel Doors and Frames	Section 08 11 13
.4	Non-Loadbearing Metal framing	Section 09 22 16
.5	Drywall suspension system	Section 09 51 00
.6	Painting	Section 09 90 00
.7	Electrical	Division 26

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 Gypsum Panel Products and Fibre-Reinforced Cement Panels

.2 CAN/ULC-S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials

.3 Gypsum Association

.1	GA-214	Recommended Levels of Gypsum Board Finish
.2	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 12°C. to 25°C.

.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.

.3 Coordinate with forces applying dry erase wallcovering in Learning Commons 203. Provide Level 5 finish, to approval of Consultant and wallcovering installer.

.4 Co-ordinate with forces installing insulation and vapour barrier in exterior soffits.

.5 Co-ordinate with wheelchair platform lift subtrade regarding installation of gypsum board in lift hoistway, at stage.

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:
- .1 Typical panels to be 16mm thick abuse resistant and mould resistant, to ASTM C1629.
- .2 CGC Sheetrock Mold Tough Abuse Resistant Firecode Core gypsum panels or GP ToughRock Fireguard X Mold-Guard Abuse Resistant gypsum board.
- .3 Panels in gypsum board ceilings in staff areas and at high ceilings may be 13mm thick mould resistant panels; CGC Sheetrock Mold Tough or GP ToughRock Mold-Guard.

.3 Rated Gypsum panels:
- .1 to ASTM C1629. Abuse resistant, mould resistant, Type X-Fire Rated
- .2 CGC Sheetrock Mold Tough Abuse Resistant Firecode Core gypsum panels or GP ToughRock Fireguard X Mold-Guard Abuse-Resistant gypsum board.
- .3 Minimum thickness to be 16mm.

.4 Fibreglass Mat panels:
- .1 Where interior panels are to be installed before the building is fully enclosed, all rated and non-rated panels shall be fibreglass mat faced panels. Panels must be warranted by the manufacturer for extended exposure to the elements.
- .2 CGC Sheetrock Brand Glass-mat Panels Mold Tough or GP DensArmor Plus Abuse Resistant panel; 16mm thick.
- .3 Use fire rated versions where rating is required.

.5 Wall Tile Backer board: CGC Durock Cement Board Next Gen

.6 Cement board: CGC Durock Cement Board Next Gen

.7 Exterior soffit board: cement board, as specified above

.8 Metal Framing: As specified in Section 09 22 00.

.9 Cold Rolled Carrying Channel: 38mm x 15mm zinc coated channel weighing min 0.707 kg per m.

.10 Corner Bead and Casing Bead: 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, to be used on framing in exterior wall behind gypsum board.

.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/Synko Setting-Type joint compound, for use with CGC joint tape.

.17 Reinforcing Tape:
- .1 Paper or fibreglass mesh tape, as recommended by the panel manufacturer for the panel type.

.18 Finish materials
- .1 use level 5 finisher; CGC Sheetrock Tuff-HideT Primer-Surfacer.

.19 Acoustic sealant: CP 506 Smoke and Acoustic Sealant by Hilti (Canada) Corp., Quietrock Quietseal Pro as manufactured by Pabco Gypsum, Tremstop Smoke & Sound Sealant as manufactured by Tremco, QuietZone Acoustic Sealant by Owens Corning or RCS20 Acoustical Sealant by GE Silicones, for acoustic partitions.

.20 Acoustic Insulation: As specified in section 07 21 00.

.21 Vapour Barrier: As specified in Section 07 26 00

.22 Ceiling Anchors: Self drilling tie wire anchors, Phillips "Red Head" T-32 or approved equal.

.23 Drywall Reveals: Fry Reglet reveal moulding DCS-625-75, giving 16mm x 19mm (5/8" x 3/4") reveal, aluminum alloy 606 375 with chemical conversion coating.
Fry Reglet Reveal DRMZ-50-75.

.24 Vent at drywall soffits: Fry Reglet EIFS soffit vent type PCS-75-V-400, 100mm wide.

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.

3.2 METAL FRAMING

.1 Refer to Section 09 22 16 non-structural metal framing.

.2 Coordinate with forces installing metal framing to ensure framing is installed as required for proper and complete application of gypsum board products and accessories.

.3 Where abuse resistant or impact resistant gypsum panels are required, confirm that all metal studs and track are the specified Bailey B18 hard board products and that other framing is 20 gauge framing.

.4 Do not regard grillage system indicated on drawings for ceilings as exact or complete.

.5 Drywall shall not be fixed directly to open web steel joists and the like. Provide cross furring as specified.

.6 Drywall panels at bulkheads shall be as specified for walls.

.7 Where framing is installed directly against exterior walls, install rubberized cork strip between studs and wall boards to provide thermal break.

3.3 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 framed partitions.

3.4 **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.

.7 Framing of typical gypsum board ceilings is specified in Section 09 22 16; framing with proprietary drywall suspension system specified in Section 09 51 00 will also be accepted.

3.5 **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.

3.6 **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 O.C. 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.

3.7 **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 Centre and apply 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 90 00.

3.8 **EXTERIOR SOFFITS**

.1 Frame all exterior soffits with 20 ga steel stud frames, anchored and braced to masonry walls / steel structure. Refer to Section 09 22 16.

.2 Cooperate with forces installing sub-soffit and fibre reinforced concrete panels at fascia and soffits.

.3 At all exterior soffits, supply and install 1 layer of 16mm cement board with extruded aluminum reveal around the entire perimeter of the soffit. Apply board to metal furring channels at 610mm o.c. with 25mm Hi-Lo screws, type S.

.4 Provide 19mm wide extruded aluminum reveals in soffit, to pattern indicated on drawings.

.5 Provide continuous soffit vent at fibre reinforced concrete soffits.

.6 Coordinate with forces applying fibre reinforced concrete panels finish at soffits; refer to Section 07 46 46.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Substrate preparation
.2 Grouting control joints in tiling substrate
.3 Waterproofing membrane Crack-Isolation membrane system (CIM)
.4 Cement mortar-bed, screed and levelling coats
.5 Thin-Set Mortar Bond Coat
.6 Installation Systems, adhesives, mortars and grouts
.7 Sealing tiling movement joints and accessory contours
.8 Sealing penetrations through walls, partitions, countertops and floors
.9 All tiling work indicated on drawings and schedules.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Concrete	Section 03 30 00
.2	Concrete Unit Masonry	Section 04 22 00
.3	Expansion Control	Section 07 95 00
.4	Gypsum Board	Section 09 29 00
.5	Toilet Accessories	Section 10 28 13

1.3 REFERENCES

.1 International Organization for Standardization
- .1 ISO 13006 — Ceramic tiles- Definitions, Classification, Characteristics and Marking
- .2 ISO 23599 — Assistive Products for Blind and Vision-Impaired Persons - Tactile Walking Surface Indicators

.2 American National Standards Institute
- .1 ANSI A108/A118/A136.1 — American National Specifications for the Installation of Ceramic Tile (Compilation)
- .2 ANSI A137.1 — Specifications for Ceramic Tile

.3 ASTM International
- .1 ASTM C 50 — Standard Specification for Portland Cement.
- .2 ASTM C 847 — Standard Specification for Metal Lath.

.4 Canadian General Standards Board
- .1 CAN/CGSB-75.1M — Tile, Ceramic
- .2 CGSB 71-GP-22M — Adhesive, Organic, for Installation of Ceramic Wall Tile
- .3 CGSB 71-GP-30M — Adhesive, Epoxy and Modified Mortar Systems, for Installation of Quarry Tiles

.5 Canadian Standards Association
- .1 CAN/CSA A-3000 — Cementitious Materials Compendium

.6 Terrazzo, Tile and Marble Association of Canada (TTMAC):
- .1 Specification Guide 09 30 00/ Tile Installation Manual 2012-2014
- .2 TTMAC Hard Surface Maintenance Guide

1.4 **SUBMITTALS**

.1 Submit required submittals in accordance with Section 01 33 00 Submittal Procedures

.2 Submit manufacturer's product data sheets on each product to be used, including:
- .1 Storage and handling instructions
- .2 Preparation instructions
- .3 Installation instructions and recommendations

.3 Submit 4 random samples of each colour of ceramic tile to be used on this project; clearly identify with manufacturer's name, colour number and project number. Do not proceed with work until samples have been approved by Consultant.

.4 Submit pattern of control and expansion joints to Consultant, for approval.

.5 Edging and Finishing profiles: Submit sample of each type and colour.

.6 Install a 2400x2400 mock-up panel complete with grout finish for Consultants approval to beginning of work.

.7 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 practises that could possible damage the finished work.

.8 Spare Materials: Provide 100 spare pieces of each floor tile and 3.0 x 3.0m of wall tile. Tiles shall be boxed, labelled, and stored where directed by the Owner.

1.5 **PROTECTION**

.1 Protect Work of this Section against damage by other trades for minimum 72 hours after application by prohibiting passage of traffic over tile.

1.6 **QUALIFICATIONS**

.1 Installer to have membership in good standing with the TTMAC; must have 10 years experience in the Work of this Section. Employ skilled mechanics trained and experienced in tile work. If requested, submit references detailing experience in at least three projects of similar scope.

1.7 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type, and grade.

.2 Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.

.3 Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.

.4 Protect mortar and grout materials against moisture, soiling, or staining.

.5 Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 **PROJECT CONDITIONS**

.1 Comply with manufacturer's requirements for environmental conditions before, during, and after installation.

.2 Do not begin installation until building is completely enclosed and HVAC system is operating and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.

.3 Maintain continuous and uniform building temperatures of not less than 12°C or more than 38°C during installation and for at least 7 days after completion of installation.

.4 Ventilate spaces receiving tile in accordance with material manufacturer's' instructions.

PART 2 - PRODUCTS

2.1 **TILE MATERIALS**

.1 Ceramic Wall Tile:
.1 108 x 327mm (4¼" x 12 ⅞") Modern Dimensions semi-gloss wall tile by Dal-Tile Corp., colours from Group 1 or 2, or 100mm x 300mm Colour and Dimension Collection by Olympia Tile.

.2 Wall base to match flooring.

.2 Each type of ceramic tile must all be from the same production batch to ensure consistent colour and texture quality. Any obvious change in tile quality will result in rejection of all tile of the affected type.

2.2 **INSTALLATION SYSTEM MATERIALS**

.1 Installation system materials and sealers to be the products of one manufacturer, who shall warrant the system against failure.
.2 Thin-set Mortar:

.1 At tile sizes over 305mm in any dimension:
.1 Non-slump, polymer-modified premium large format tile mortar, conforming to ANSI-A118.4 and A118.11, ISO 13077 class C2TES1P1; Ultraflex LFT by Mapei Canada Inc., Laticrete 4-XLT by Laticrete International Inc., Ardex X77 by Ardex Engineered Cements, or TEC Ultimate Large Tile Mortar by H.B. Fuller Construction Products Inc.

.2 At tile sizes 305 x 305mm and smaller:

.1 single component, polymer-modified premium tile mortar, conforming to ANSI-A118.4 and A118.11, ISO 13077 class C2ES; Ultraflex 3 by Mapei Canada Inc., Laticrete 254 Platinum by Laticrete International Inc., Ardex X5 by Ardex Engineered Cements, or TEC 3N1 Performance Mortar by H.B. Fuller Construction Products Inc.

.3 Epoxy Grout:

.1 Industrial grade 100% solids epoxy grout, water cleanable, stain resistant. Mapei Kerapoxy IEG CQ or TEC AccuColor EFX Epoxy Special Effects Grout.

.2 Required at all floor and wall tile in all washrooms.

.3 Colour to be selected by the Consultant.

.4 Cementitious Grout:

.1 Conforming to ANSI A118.6, polymer-modified grout, "Ultracolor Plus" with "BioBlock", by Mapei Canada Inc., or 1500 Sanded Grout with Microban, by Laticrete, or Ardex FL. Grout to be fast setting, polymer modified cementitious grout.

.2 With grout additives as specified below.

.3 Colour to be selected by the Consultant.

.4 Use epoxy grout at floor tile in washrooms and at walls behind urinals.

.5 Grout Additives: To be supplied by grout supplier, Plasti-joint by Mapei or 1776 Grout Enhancer by Laticrete, or approved equal, for cementitious grout.

.6 Wall Mastic: Conforming to ANSI-136.1 Type 1. Type 1 mastic by Mapei or Latamastic by Laticrete, or Ardex D 14.

.7 Levelling coat: Refer to Section 09 01 61; Self-curing liquid latex, Portland cement based floor levelling product by Mapei, Laticrete, Ardex, or H.B. Fuller. Levelling coat must be compatible with mortar being used, and approved by the manufacturer for the specific application.

.8 Sealants: Conform to Section 07 92 00.

2.3 **ACCESSORIES**

.1 Accessory products must be compatible with all other products used in tile installation system. Confirm compatibility with product manufacturers.

.2 Anti-Fracture Membrane:

.1 Laticrete two component anti-fracture membrane "Blue 92", or Mapei Mapeguard 2 with Mapei SM Primer , or Ardex 8 + 9.

.3 Waterproofing:

.1 seamless, load-bearing 2 component, trowel-applied Acrylic/Cement mortar and fiber-mesh reinforcement waterproofing system, to ANSI A118.10

.2 Laticrete 9235 waterproofing membrane, Mapei "Mapelastic 315", or Ardex 8 + 9 with Ardex SK Mesh.

.4 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.

.5 Expansion Joints: refer to section 07 95 00, Expansion Control.

.6 Joint Sealants: Conform to Section 07 92 00.

.7 Sealer: to CAN/CGSB-25-20, as recommended by tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION AND EXAMINATION

.1 Coordinate locations and depths of any slab depressions required for the work of this section. If any discrepancies exist between the drawings and the recommended installation methods of the TTMAC, the manufacturers, or these specifications, notify the Consultant immediately, in writing.

.2 Examine surfaces prepared to receive installation of tiling. If conditions are not acceptable, report to Consultant, in writing. Commencement of installation of any part of the Work of this section will be construed as acceptance of existing conditions.

.3 Ensure concrete substrate is fully cured prior to commencing tile installation; wait a minimum of 60 days after placement of concrete floor slab.

.4 Substrate must be structurally sound, solid, stable, level, plumb and true to a tolerance in plane of 6 mm in 3000 mm.

.5 Substrate shall be dry, clean and free of dust, oil, grease, paint, tar, wax, curing agent, primer, sealer, form release agent or any deleterious substances which could inhibit adhesion.

.6 Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

.7 Ensure compatibility of substrate materials with materials supplied under this Section.

.8 Mechanically sand or scarify the substrate as required to completely remove all sealers, loosely bonded topping, loose particles and contaminants. Surface etching or contaminant removal by chemical means is not permitted.

.9 Apply levelling coat to level floors and where required to build up concrete floors slabs to elevations as noted on the Drawings or as directed by the Consultant. Levelling coat to be used to correct substrate irregularities up to 8 mm thickness. Above 8 mm, use mortar bed method to correct irregularities.

.10 Review setting out point with consultant for each location; verify patterns and edge conditions.

.11 Verify that substrate expansion joints have been installed properly.

3.2 **INSTALLATION**

.1 Regard recommendations, installation methods and materials specified and illustrated in Terrazzo, Tile and Marble Association Manual, latest issue, and applicable manufacturer's instructions as minimum acceptable standards. Provide additional work and materials as required to meet the contract specifications and the drawing details.

.2 Lay tile to pattern indicated on drawings. Unless otherwise indicated, arrange pattern so that a full tile or joint is centred on each wall and that no tile less than ½ width is used. Do not interrupt tile pattern through openings.

.3 Install tile on masonry walls by thin-set method, to TTMAC detail 303W.

.4 Do not cover expansion and control joints in substrate with mortar or tiles.

.5 Apply anti-fracture membrane over substrate before applying thin-set mortar.

.6 Before commencing installation, wipe all dust from back of tile with a damp sponge.

.7 Use tile setting method specified hereinafter. All tile must be fully bedded using suitable notched trowels to ensure full, even bedding.

.8 Apply mortar using notched trowel, of type recommended by mortar manufacturer for specific installation. Do not spread more material than can be covered before it begins to skin over.

.9 Set tiles before skinning occurs. Back butter each tile immediately before laying, to achieve full mortar contact.

.10 Set tiles firmly over wet mortar; shifting tile in the direction of the mortar ridges to ensure full mortar contact. Beat in tile to flatten ridges into a continuous bed. Between 25% and 33% of the tile is to be imbedded in the mortar. Adjust tile for correct alignment.

.11 Make joints of tiles 3mm in width. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Do not use gauges, string or plastic spacers. Make joints watertight, without voids, cracks, excess mortar, or excess grout. Provide minimum 85% mortar coverage.

.12 Using a damp sponge, clean all joints and wipe all mortar smudges from the face of the tile before mortar hardens.

.13 Keep expansion joints free of adhesive or grout.

.14 Place tile snugly around piping, fixtures and other items built in or passing through tile work. Form external angles with round edge tile extending over edge of square edge adjacent tile. Internal angles shall be formed square, carrying 1 flat tile past edge of other.

.15 Drill holes for fixing accessories of other trades.

.16 Finish surfaces flat and level or sloped and graded as required.

.17 Provide stringers, caps, coves, corners, angles and other moulded pieces to suit requirements of job. Ensure that striping and joints are in alignment.

.18 Lay out borders and defined lines, wherever they occur, prior to setting of adjacent tile. Keep inner edges of borders against fields or wall panels straight.

.19 Cut tiles to conform to irregularities in wall lines and vertical planes along outer edges. Smooth cut edges with carborundum block or by other means to provide clean straight edges.

.20 Install wall base free of sharp corners or exposed edges. Form internal angles square and external angles bullnosed.

.21 Wait at least 24 hours after tile installation before grouting. Grout joints, leave to set for 45 minutes, then rub with "scrubby" brush to break surface, make one pass with clean sponge to leave grout joint flush with tile.

.22 Install control joints at a maximum spacing of 4m in both directions in large rooms, one direction in corridors. Conform to shop drawing showing pattern of control and expansion joints, as approved by the Consultant.

.23 Feather out thresholds at junctions of uneven floor finishes. Feather out floor and aluminum of 1800mm

.24 Repoint joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.

.25 Finished tile to be clean and free of tiles which are pitted, chipped, cracked or scratched.

3.3 **CLEANING AND PROTECTION**

.1 Clean tile work progressively as work proceeds. Do not allow mortar to stain absorbent tile. Do not use acids for cleaning.

.2 Seal tile in accordance with TTMAC recommendations using TTMAC certified products only.

.3 Conform to Section 07 92 00 for Joint Sealants.

.4 Protect finished areas from traffic until setting materials have cured. Protect grouted areas from foot traffic for72 hours after completion of grouting.

.5 Provide protective covering in traffic areas until building is ready for occupancy.

END OF SECTION

PART 1 - GENERAL

1.1 CEILING SYSTEMS

.1 This Specification includes the ceiling systems listed below, noted in schedules and shown on reflected ceiling plans.

.2 Typical ceiling systems shall be 610mm x 1220mm lay in exposed Tee system, rated and non-rated. Rated ceiling systems to conform to U.L.C. details, i217 AND r210.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Gypsum Board	Section 09 29 00
.2	Acoustic Wall Units	Section 09 84 33
.3	Mechanical Equipment	Divisions 21, 23
.4	Electrical Equipment	Divisions 26, 27

1.3 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

1.4 DESIGN

.1	N.R.C. Range:	Unless otherwise noted under description of ceiling system the N.R.C. Range shall be 60-65 (Table 1 of CAN/CGSB 92.1).
.2	Ceiling S.T.C.:	Unless otherwise noted under description of ceiling system the S.T.C. rating shall be 35 or better.
.3	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.

.4 Support of HVAC and Electrical Equipment:
.1 Provide additional hangers as required for support of light fixtures and diffusers, etc.

1.5 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 Accurately locate lighting fixtures, ventilating grilles, sprinkler heads, exit lights and other ceiling fittings.

.3 Conform to Section 01 33 23.

1.6 **SAMPLES**

.1 Upon award of the Contract submit full size sample panels proposed for installation in the project. All panels subsequently used on the job shall match the approved sample.

.2 Submit samples of suspension system members for approval prior to commencement of installation.

1.7 **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.

1.8 **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.

1.9 **EXTRA PANELS**

.1 Provide 2% typical 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.

1.10 **SPECIAL CLEANING**

.1 Clean, repair or replace dirty, discoloured or defective units or exposed suspension members to Consultant's satisfaction.

1.11 **ENVIRONMENT**

.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.

1.12 **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.

PART 2 - PRODUCTS

2.1 **MATERIALS - LAY-IN SYSTEM**

.1 Acoustic Ceiling Panels

.1 Refer to Finish Schedules for LAT numbers and locations as follows:

LAT 1: 610mm x 1220mm, min. NRC of .75, CAC min. 35; CGC Radar Open Plan panels 22325, Armstrong School Zone Fine Fissured 1755, or CertainTeed Performa Sereno Fine Fissured SS-497.

LAT 2: 610mm x 1220mm, min. NRC of .70, CAC min. 40; CGC Radar High NRC/CAC Firecode panels, Armstrong School Zone Fine Fissured 1811 Fire Guard, or CertainTeed Fine Fissured #PFF-197. Minimum weight to be 6.74kg/m^2 (1.38 lb/sq.ft.).

.2 Suspension Systems:

.1 Typical suspension system to be 24mm wide faced T-bar; CGC Donn Brand DX/DXL, Armstrong Prelude ML, of CertainTeed 15/16" Classic Stab System #CH1-12-12. Equivalent grid by Chicago Metallic will be accepted, contingent on its compatibility with the specified ceiling tiles.

.2 Provide rated grid where rated ceiling assemblies are required.

.3 Exposed interlocking tee grid system, formed out of cold rolled zinc-bond steel 0.54mm thick. Provide fire rated grid where fire ratings noted.

.4 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 fo 1/360 of the span.

.5 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.

.6 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.

.7 Accessories:

.1 Splice plate, clips, screws, etc. as required to complete the installation. All galvanized finish.

.8 Concealed flat spline: 0.71mm flat steel spline.

.9 Edge Trim:

.1 0.635mm zinc bonded, cold rolled steel mould.
.2 Trim shall be minimum 22mm x 22mm angles; CGC M7.
.3 Provide 50mm wide shadowline trim at perimeter of corridor ceilings; CGC MS274.
.4 Provide aluminum trim at ceilings with aluminum grid; CGC M7A.

.10 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.

.11 Specialty Trim:

.1 Straight perimeter trim, 100mm height, steel, complete with attachment clips; CGC Compasso Standard trim.
.2 Provide factory mitred corners.
.3 Armstrong Axiom Classic extruded aluminum trim will also be excepted, contingent on compatibility with grid. If aluminum trim is used, provide aluminum grid, or provide separation between steel and aluminum components to prevent galvanic corrosion.

.12 Carrying Channels: 38mm x 19mm cold rolled galv. weighing 1.042 kg per metre.

.13 Tie Wire: 1.6mm galvanized soft annealed steel.

.14 Hangers: 2.6mm galvanized steel wire.

.15 Screws: Corrosion resistant, self-tapping Philips truss head, of length and gauge to suit installation.

.16 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 Provide 50mm wide shadowline trim at perimeter of corridor ceilings

.8 Provide 100mm high specialty trim where ceiling grid does not extend to walls, and as indicated on drawings.

.9 Consult with Electrical and Mechanical Trades for requirements and provide access to valves and switches.

.10 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.

.11 Install panels only after all mechanical and electrical equipment, conduits, piping, telephone distribution, etc. are in place.

3.2 INSTALLATION OF LAY-IN SUSPENSION SYSTEM

.1 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.

.2 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.

.3 Frame up around light fixtures, grilles, diffusers, speakers, openings, etc. as required.

.4 Secure edge mouldings to walls, bulkheads and other vertical surfaces at perimeter edges of acoustic ceilings. Note special mouldings required.

.5 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.

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 Conform 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

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Concrete Floors	Section 03 30 00
.2	Flooring Preparation	Section 09 01 16
.3	Ceramic Tile	Section 09 30 00
.4	Carpet Tile	Section 09 68 13

1.2 REFERENCE STANDARDS

.1 ASTM Standards

.1	F 141	Resilient Floor Coverings
.2	F 386	Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
.3	F 511	Quality of Cut (Joint Tightness) of Resilient Floor Tile
.4	F 710	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
.5	F 1066	Specification for Vinyl Composition Floor Tile.
.6	F 1304	Deflection of Resilient Floor Tile
.7	F 1344	Specification for Rubber Floor Tile
.8	F 1861	Specification for Resilient Wall Base
.9	F 2055	Size and Squareness of Resilient Floor Tile by Dial Gage Method
.10	F 2169	Specification for Resilient Stair Treads
.11	F 2195	Specification for Linoleum Floor Tile
.12	E 662	Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
.13	E 1907	Methods of Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings
.14	F 970	Standard Test Method for Static Load Limit

.2 ULC

.1	CAN/ULC-S102.2	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies

.3 Resilient Floor Covering Institute (RFCI)

.1	IP #1	Recommended Installation Practice for Homogeneous Sheet Flooring, Fully-Adhered
.2	IP #2	Recommended Installation Practice for Vinyl Composition Tile (VCT)

.4 International Organisation for Standardization (ISO)

.1	ISO 23599	Assistive Products for Blind and Vision-Impaired Persons – Tactile Walking Surface Indicators.

1.3 SUBMITTALS

.1 Submit samples as per Section 01 33 23. Submit manufacturer's samples of actual sections of tile and accessories; include manufacturer's full range of colour and patterns available.

.2 Samples for Verification Prior to Installation: Submit full size samples of all types, colours, and patterns selected, indicating full range of patterning and colour variations.

.3 Submit manufacturer's printed installation instructions and maintenance manuals for each material specified.

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 Vinyl Composition Tile (VCT):

.1 Conforming to CSA A126.1. Vinyl composition tile, 305mm x 305mm x 3.2mm.

.2 Standard Excelon Imperial Texture by Armstrong Flooring, or Azrock VCT by Johnsonite.

.3 Colours to be selected by Consultant; allow for four colours, two field colours and two accent colours.

.3 Luxury Vinyl Tile (LVT):

.1 High Performance LVT Flooring, min 4.5mm thick with minimum 22mil wear layer, no-wax finish, wood pattern
.2 Interface Studio Set 250mm x 1000mm planks, Ashlar Patern no alternatives
.3 LVT 1: Field - A00701 Silverlight
.4 LVT 2: Accent Colour - A00709 Ocean
.5 LVT 3: Accent Colour - A00712 Marigold
.6 LVT 4: General Purpose Room - A00212 Cedar

.4 Rubber Sheet Commercial Flooring (RS)

.1	Product Name:	Noraplan ConviaTM, Article 170F
.2	ASTM Specification:	ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing Type I
.3	Limited Wear Warranty:	15 years
.4	Material:	nora vulcanized rubber compound 913 with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium, or mercury
.5	Composition:	Homogeneous rubber compound with a random scattered design
.6	Color:	RS1 = 7351 Pearl Grey RS2 = 7359 Iced Taupe
.7	Surface:	Smooth
.8	Back of Sheet:	Double-sanded smooth
.9	Material Dimensions (ASTM F1859):	49.21 feet by 48 inches (15m by 1.22m), or amount specified
.10	Thickness (ASTM F386):	± 0.006 inches (± 0.15mm) is required 0.08 inches (2mm)
.11	Flammability (E648/NFPA 253)	0.45 watts/sq. cm for Class 1 is required NBSIR 75 950, 0.97
.12	Smoke Density (ASTM E662/NFPA 258):	< 450 is required NBS, 196 (flaming) and 207 (non-flaming)
.13	Surface Burning (CAN/ULC-S102.2):	FSC1 of 125 and SD of 370
.14	Burn Resistance:	Resistant to cigarette and solder burns
.15	Slip Resistance (ASTM D2047):	0.5 is required Static coefficient of friction, Neolite dry 0.93, Neolite wet 0.90
.16	Bacteria Resistance (ASTM E2180/ASTM G21):	Resistant to bacteria, fungi, and micro-organism activity
.17	Indoor Air Quality:	Greenguard Gold Certified for low VOC emissions in compliance with CDPH 01350
.18	Carbon:	3rd party verified carbon neutral throughout their entire life cycle through the Interface Carbon Neutral FloorsTM program.
.19	Transparency:	Cradle to Cradle v3.1 Silver, Environmental Product Declarations (EPDs), Health Product Declarations (HPDs), and Greenhealth Approved.
.20	Latex Allergies (ASTM D6499):	Inhibition ELISA, results are below detection level
.21	Sound Absorption (ASTM E2179/ISO 10140-3):	IIC 11, ? Lw 8 dB (compare only ? values)
.22	Sound Generation:	67.9 dBA, 69.9 dBC and 22 Sones, independently tested
.23	Hardness (ASTM D2240):	85 is required Shore type A, 92 achieved
.24	Static Load (ASTM F970):	0.005 inches with 250 lbs. is required Residual compression of 0.003 inches with 800 lbs.
.25	Rolling Load Limit (ASTM F2753)	450 lbs. / sq. inch, with no forklift traffic
.26	Abrasion Resistance (ASTM D3389):	0.035 oz. (1.0g) is required 1.1 lbs. (500g) load on H-18 wheel with 1000 cycles, 0.008 oz. (0.24g) weight loss
.27	Elongation (ASTM D412):	300 lbs. per sq. inch is required Modulus @ 10% is 913.1 lbs. per sq. inch
.28	Oil & Grease Resistance (EN/ISO 26987):	No

.29 Heat Resistance (ASTM F1514): Avg. 8.0 is required Easily achieved with all batches and regular maintenance

.30 Light Resistance: Avg. 8.0 is required Easily achieved with all batches and regular maintenance

.31 Static Generation (AATCC 134): < 1000 Volts at 20% RH

.32 Thermal Transmission (ASTM C518): R-value of 0.04

.33 Cleaning: Cleaned and maintained effectively using water, nora pads and a suitable cleaning machine, without the use of any factory and/or field-applied coatings. Also, without using any chemicals that may be hazardous or containing any teratogenic, mutagenic or any other ingredients known to be carcinogenic. Refer to nora Maintenance Guidelines for product specific details.

.34 Shine: Higher shine achieved by buffing without any artificial topical applied coatings.

.35 Stain Removal: Samples of the product must be provided for stain removal testing by the owner. Sample size must be 24 inches by 24 inches, pre-cleaned by manufacture per published recommendations. Samples must have no coatings, sealers, floor finish or other manually or mechanically applied finish on the surface of the product. Stain testing must consist of application of common healthcare related disinfectants and chemicals to include, but not limited to, Betadine, Methylene Blue, Silver Nitrate, and alcohol-based hand sanitizer. Duration of the test period must be no less than one week. Removal of chemicals must be in accordance with manufacturers published cleaning and maintenance recommendations.

.36 Substrate Preparation: Per ASTM F710 and the nora Installation Instructions

.37 Heat weld all seams in washrooms, universal washrooms, storage rooms, utility rooms, and vestibules.

.5 Base:

.1 102mm x 3mm thick "Traditional" rubber cove base by Johnsonite or equivalent rubber base by Armstrong. Colour as selected at a later date by the Consultant.

.6 Sealer: Type approved by flooring manufacturer.

.7 Edge Trim: Aluminum or brass alloy with lip of edge strip extending under and with shoulder finishing flush with top of resilient floor at all locations where dissimilar floor finishes meet.

.8 Feather out resilient flooring minimum 1800 mm beyond transition point to create even surface between dissimilar materials, including all transitions between LVT, Carpet Tile, Rubber Sheeting Flooring, VCT, and all areas where new flooring meets with existing flooring

.9 Trowelable Levelling Agent:

.1 K60 Arditex Rapid Setting Latex Smoothing and Levelling Compound by Ardex; Portland cement based, self-smoothing, trowelable, latex levelling compound.

.2 For transitioning between finish floor levels.

PART 3 - EXECUTION

3.1 EXAMINATION 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/100m^2/24hours (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 Take readings of room temperature and relative humidity (RH) before, during, and after installation. Environmental conditions shall conform to these specifications and the requirements of the material manufacturers.

.6 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 The permanent HVAC system must be in operation before installing VCT.

.3 Keep all tile and accessories at the job site at room temperature (min.18°C. and max. 29°C.) for at least 48 hours before installation, during the work, and for minimum 48 hours after completion of installation.

.4 Ensure that interior air relative humidity (RH) is within limits recommended by the product manufacturers, as excessively high or low RH will affect curing of floor patching and levelling materials.

.5 Obtain approval from manufacturers for all adhesives, caulking, patching and levelling agents, installation methods, and environmental conditions, before proceeding with the work of this section.

.6 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 nonshrinking 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.

.5 Where resilient abuts high floor finishes, such as porcelain tile, build up edge of lower flooring with trowellable smoothing and levelling compound; feather over 1800mm to eliminate ridges.

3.4 **APPLICATION - VCT**

.1 Apply adhesive uniformly with an approved notch-tooth spreader at the recommended rate. Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Wipe up excess adhesive as work progresses.

.2 Install flooring in conform to floor patterns on drawings, where applicable.

.3 Unless otherwise indicated on drawings, lay out each area to be tiled symmetrically from its axis. Adjust starting line so width of border tile shall be at least one half tile. Distribute tiles having varying tones or texture evenly over entire floor area to avoid patches or streaks, and to produce homogeneous blend. Reject tiles having undue variations in colour, shade and texture. Make tile joints flush, uniform, in straight lines and as inconspicuous as possible.

.4 Lay out tiles so that joints are parallel to axis of room are continuous. All joints to be staggered.

.5 Cut flooring around excessively heavy or fixed objects. Lay tile so that it is flush with adjacent floor surfaces.

.6 Roll tile with 68 kg roller immediately after laying. In areas inaccessible to large roller, use a small hand roller.

.7 Install metal edge strips at unprotected edges of resilient flooring.

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 **APPLICATION - LUXURY VINYL TILE**

.5 Apply adhesive uniformly with an approved notch-tooth spreader at the recommended rate. Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout. Wipe up excess adhesive as work progresses.

.6 Install flooring in conform to floor patterns on drawings.

.7 Distribute planks having varying tones or texture evenly over entire floor area to avoid patches or streaks, and to produce homogeneous blend. Reject planks having undue variations in colour, shade and texture. Make tile joints flush, uniform, and as inconspicuous as possible.

.8 Lay out plans so that joints are parallel to axis of room are continuous. All joints to be staggered.

.9 Establish centre of room and adjust layout to ensure that no plank sections at perimeter of room will be less than 450mm in length. Stagger planks for a random appearance, while ensuring joints are offset at least 150mm from adjacent joints.

.10 Cut flooring around excessively heavy or fixed objects. Lay plank flooring so that it is flush with adjacent floor surfaces.

.11 Roll flooring with 68 kg roller immediately after laying. In areas inaccessible to large roller, use a small hand roller.

.12 Install metal edge strips at unprotected edges of resilient flooring (ie. at under Stage storage area).

3.7 **APPLICATION - RUBBER SHEET FLOORING**

.1 Install Rubber Sheet Flooring with the manufacturer's printed installation instructions for Nora Convia Installation.

.2 Heat weld seams at washrooms, universal washroom, utility room, storage equipment room, and vestibules as per manufacture's instructions. .

.13 Lay out flooring material, doing all required cutting and fitting, before applying adhesive. Allow to acclimatize for 24 hours prior to installation.

.14 Lay flooring with seams parallel to building lines and to produce minimum number of seams.

.15 Apply adhesive minimally, to Nora standards, as uniformly with an approved notch-tooth spreader at the rate recommended by the manufacturer. Do not spread more adhesive than can be covered before initial set takes place. Use waterproof adhesive throughout.

.16 Run sheets parallel to width of rooms. Start laying in the centre of the room. Take care to keep lengths straight and even.

.17 Roll flooring as work progresses to ensure full adhesion. Use a medium weight steel roller, pushing toward the seams to eliminate any trapped air. Immediately remove any adhesive seeping through seams. Keep surface of flooring free of adhesive.

.18 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.19 Seal all seams using heat welded method in complete accordance with material manufacturers recommendations and materials. Ensure that adhesive has had adequate time to set properly before seams are welded.

3.8 **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 school custodial staff.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Supply and installation of textile composite flooring modules as indicated on drawings and schedules and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Cast-In-Place Concrete	Section 03 30 00
.2	Flooring Restoration	Section 09 01 61
.3	Ceramic Tile	Section 09 30 00
.4	Resilient Flooring	Section 09 65 00

1.3 REFERENCES

.1 Carpet and Rug Institute

.1 CRI 104 - Standard for Installation of Commercial Carpet

1.4 SUBMITTALS

.1 Submit for approval two 300mm x 300mm samples of each carpet colour.

.2 Submit samples of all carpet accessories to be used.

.3 Submit manufacturer's product data verifying compliance with Specification requirements for carpet, binder bar and adhesive material.

.4 Submit manufacturer's installation instructions, and a copy of the material warranty which will be issued.

.5 Submit certification verifying compliance of carpet material with:

.1 Flame resistance to CGSB 4-GP-155M; by certification as conforming to Hazardous Products Act, Carpet Regulations or a test report certified by approved independent testing laboratory.

.2 ULC flame spread and smoke developed classification by ULC listing or test report certified by nationally recognized fire test laboratory.

.3 Submit certification with submission of samples.

.6 Provide maintenance instructions for inclusion in Maintenance Manuals as specified in Section 01 78 00.

.1 Maintenance instructions shall contain specific warning against maintenance methods and materials harmful to the appearance and durability of installed carpet tile.

1.5 **QUALIFICATIONS**

.1 Contractor to be an approved applicator of the material manufacturer, with minimum 5 years experience with installation of commercial carpet tile in projects of similar or greater scope.

1.6 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver all materials, including adhesives, to site a minimum of 48 hours prior to start of installation. Store in a clean and dry room at temperature between min. 18°C and max. 35°C (65°F - 95°F) and relative humidity (RH) between 10% and 65%. Permanent heating and air conditioning systems (HVAC) must be in operation.

.2 Store pallets of textile composite flooring modules on a flat surface (do not double stack pallets).

1.7 **WARRANTY**

.1 Provide a Warranty for an extended period of **ten (10) years** from the date of Substantial Performance of the Contract. Warranty shall be signed by both manufacturer and installer.

.2 Provide manufacturer's standard lifetime warranty for carpet tile and adhesive.

.3 Defects shall include, without being limited to, the following: deterioration of backing, delaminations, failure of seams, zippering, stretching or wrinkling, loss of more than 5% of surface pile in any given area, excessive fading, unravelling. Decision of Consultant on loss of pile to be final and binding.

1.8 **EXTRA MATERIAL**

.1 Supply at completion, minimum 20 carpet tiles of each colour and pattern installed.

.2 Store extra carpet tile where directed by the custodian. Obtain signed receipt, include receipt in maintenance manual.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Carpet Tile: Interface Open Air Stria 403, 500 x 500, Ashlar; colours (2 required) to be selected from manufacturer's standard range.

.1 Properties:

.1	Fibre Type:	Polyester
.2	Dye Method:	Solution Dyed
.3	Backing:	Polyester Felt Cushion
.4	Total Weight:	1370 - 1585 g/m^2. (4.5 - 5.2 oz /sq.ft.)
.5	Total Thickness:	5.2mm
.6	IAQ Certification:	CRI Green Label Plus

.2 Flame resistant: to meet or exceed CGSB standard 4-GP-155M.

.3 Use carpet manufactured from yarns of the same dye lot for each colour. Select materials for colour and pattern consistancy using matching pieces in each location.

.4 Adhesive: Refer to manufacture's installation instructions. Refer to manufacture's installation guidelines for moisture and pH levels prior to installation.

.5 Edge Protection:

.1 Carpet tile/ resilient flooring transition: Johnsonite CTA-XX-Y. Colour to be selected by Consultant.

PART 3 - EXECUTION

3.1 ENVIRONMENT

.1 Do not install carpet tile when air temperature of subfloor is below 10°C.

.2 Permanent heating and air conditioning systems (HVAC) must be in operation.

.3 Concrete slab shall have cured for a minimum of 90 days and shall be dry.

.1 Test concrete for moisture content using in situ probe RH test in accordance with ASTM F 2170.

.2 Do not proceed with carpet tile installation if moisture content exceeds 75% RH.

.3 If moisture or pH conditions are outside specified values, installation may only proceed if mitigating treatment is applied, in accordance with carpet manufacturer's instructions.

.4 Module installation shall not commence until painting and finishing work is complete and ceiling and overhead work is tested, approved and completed.

.5 Traffic shall be closed during the installation of the textile composite flooring products.

.6 Protect materials from the direct flow of heat from heating fixtures and appliances such as hot-air registers, radiators, or other.

.7 After work is completed, maintain ambient room temperature at 18°C (65°F) and relative humidity between 10% and 65% for at least 48 hours.

3.2 PREPARATORY WORK

.1 Surface to receive carpet shall be clean and free of dust, grease, wax and other deleterious materials.

.2 Examine subfloor and ensure surfaces are smooth and flat.

.3 Old adhesives are to removed completely; refer to specifications Section 02 40 00 for removal of existing floor finishes.

.4 Refer to Section 09 01 65 for subfloor restoration specifications. Confirm, with manufacturer, compatibility of patching and levelling products with carpet adhesive.

.5 Ensure that any applied sealer is compatible with carpet adhesive.

.6 Do not proceed with carpet tile installation unless substrate conditions are acceptable.

3.3 **INSTALLATION - GENERAL**

.1 Install carpet tile after finishing work is completed. HVAC system shall be operating and spaces must stay withing 18°C and 30°C for at least 48 hours prior to, during, and at least 48 hours after carpet installation.

.2 Once the temperature and relative humidity in area for installation have been stabilized, loose lay the modules within the installation area and allow them to precondition for 48 hours prior to installation.

.3 Inspect carpet tile for any visible defects, colour variations, or improper style. Discard any irregular tiles. Arrange tiles to ensure perfect colour, pattern and texture match within any one area.

.4 Install carpet tile in a quarter turn installation pattern, unless otherwise instructed by the Consultant.

.5 Finish installation to represent smooth wearing surface free from conspicuous seams, burring or other faults.

3.4 **INSTALLATION - GLUE DOWN METHOD**

.1 Installation to be direct glue down method installed using best installation methods recognized for this type of carpet and to approval of the manufacturer. Comply with manufacturer's printed instructions.

.2 Apply adhesive at rate recommended by the manufacturer for the substrate, and with recommended tools.

.3 Confirm drying time for adhesive, given environmental conditions at the time of application, and apply carpet within 2 hours after adhesive has dried.

.4 Install tiles in the order they were manufactured; select pallets in sequential order and follow the numbers located on each bundle of modules.

.5 At columns and other penetrations, cut carpet with maximum possible overage. Position the seams made by these cuts first.

.6 Carpet edges shall extend under wall or fitment bases. Edges of carpet in door reveals shall occur directly under centreline of door bottom.

.7 Provide metal binders and transition strips at thresholds and at junction with other flooring materials.

.8 To avoid dislodging modules, do not walk on or move furniture onto modules until the area is completely anchored. Roll entire area with 75-100 lb. roller in both directions (north-south and east-west) after completion of installation.

3.5 **CLEANING AND PROTECTION**

.1 After installation is complete, remove all cuttings, clean with an upright vacuum cleaner and protect as specified.

.2 Clean carpet tile with a moist cloth if wet; if dry, use a solvent based product applied to a towel then worked onto the module for removal of any contaminants, such as adhesive, paint, oil and grease. Follow manufacturer's maintenance guidelines.

.3 Protect traffic areas of carpeted floors with 6 mil polyethylene drop sheets. Tape joints to prevent shifting.

.4 Provide sheets of plywood or hardboard over the new carpet tile surface when transporting heavy furniture on carts or dollies.

.5 Do not remove protection without Consultant's written authorization.

.6 Clean and vacuum surfaces immediately prior to occupancy by the Owner.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Concrete Unit Masonry Section 06 20 00
.2 Finish Carpentry Section 06 20 00

1.2 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 01 33 23.

.2 Shop drawings shall indicate locations of each type of acoustic unit. Clearly show details, elevations, hardware and installation details. Provide a numbering system for locating panels.

.3 Indicate field measurements on shop drawings.

.4 Submit panel samples as required by Consultant. Submit fabric samples for colour selection.

1.3 ENVIRONMENTAL CONDITIONS

.1 Commence installation after dust generating activities are completed.

.2 Permit wet work to dry prior to commencement of installation.

.3 Maintain uniform minimum temperature of 15°C and relative humidity of 20% - 40% prior to, during and after installation.

1.4 MAINTENANCE MATERIALS

.1 Deliver fabric for maintenance use amounting to 2% for each fabric required for the project. Store fabric where directed. Identify all packages.

.2 Installed and maintenance materials to be of same production run.

PART 2 - PRODUCTS

2.1 MATERIALS, FABRIC-WRAPPED PANELS

.1 Acoustic Wall Units to be fabric-wrapped fibreglass insulation with square, hardened edges, tackable and non-tackable, with mechanical fastening system. Include for 2 colours.

.2 Impact Resistant, Tackable Panels:
.1 Avanti P2 Hardfaced Tackable Acoustic Wall Panels by Sound Solutions Canada Ltd., Respond High Impact Acoustic Panels by Conwed Designscape, Hard Impact Hardside Acoustic Wall Panels by Kinetics Noise Control, or Fabri-Lok Impact Resistant Modular Panels by Wallworks Acoustic Architectural Products; custom fabricated and meeting these specifications.

.2 Core: total 28 mm thick, consisting of 25mm thickness of 96 kg/m^3, fibreglass, with minimum 3mm thickness of 280 kg/m^3 high density acoustically transparent surface bonded to fibreglass core, integrally hardened frame.

.3 Fabric: Class A, flame spread rating not more than 25 as per U.L.C. CAN4-S102 or ASTM E84 Tunnel Tests; Guilford of Maine FR701, style 2100, 100% recycled polyester fabric; colours from manufacturer's standard range.

.4 Adhesive: Low VOC adhesives, to panel manufacturer's recommendations.

.5 Mounting System:
- .1 Mechanical mounting system with concealed brackets and clips.
- .2 Panel clips and matching wall track, to acoustical panel manufacturer's system installation details and recommendations.
- .3 Provide stops at top of units to deter unauthorized removal, except where units are accessible only by ladder.

.6 Base Support Brackets: as per acoustical panel manufacturer's recommendations.

2.2 **FABRICATION, FABRIC-WRAPPED PANELS**

.1 Fabricate acoustic panels to sizes and shapes as shown on Drawings. Wrap acoustic panels in specified fabric. Colours to be selected by Consultant.

.2 Adhere fabric to core with adhesive. Tailor finish fabric and return to rear of panel. Mitre fabric, do not wrap, at corners.

.3 Appearance of finished panel to be flush and smooth with no visible seams.

.4 Edges to be square.

.5 Mechanically fasten panels to substrate including the use of panel clips and matching wall clips. Firmly attach panel clips to panel.

.6 Refer to Interior Elevations for size and location of panels and details of wood trim.

PART 3 - EXECUTION

3.1 **INSTALLATION - GENERAL**

.1 Lay out acoustical panels as shown on Shop Drawings. Co-ordinate installation with installer of wood trim to ensure neat junctions and concealed fasteners.

.2 Install acoustic panels after painting and in conjunction with installation of wood trim.

.3 Surface for mounting acoustic panels to be clean, dry and firm.

.4 Surface for mounting panels to be straight to tolerance of plus or minus 3mm over 3m.

3.2 **INSTALLATION - FABRIC PANELS**

.1 Panels to be installed where indicated on drawings and as per reviewed shop drawings.

.2 Fasten base support brackets and wall clips with screws to blocking behind substrate surface. Provide to top of panels a method of holding panel so it cannot be inadvertently removed.

.3 Provide templates indicating position of wall clips and base support brackets for installation of blocking.

.4 Locate base support brackets at the start of each panel run and at each joint.

.5 Hardware or fasteners shall not be visible after installation of acoustical panels.

3.3 **CLEANING**

.1 Keep acoustical panels and all components clean and remove all blemishes.

.2 Do all cleaning in conformance with Section 01 74 00.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Demolition and Alterations	Section 02 40 00
.2	Metal Fabrications	Section 05 52 00
.3	Finish Carpentry	Section 06 20 00
.4	Hollow Metal Doors and Frames	Section 08 11 00
.5	Gypsum Board System	Section 09 29 00

1.2 SCOPE OF WORK

.1 This Section is intended to cover all repainting of existing surfaces and painting of new surfaces in renovated areas. With the exception of painting specifically called for in other Sections of the Specifications, all painting work is included in the scope of this Section of the Specification. Refer to Room Finish Schedules for both renovated rooms and rooms which require repainting (but not being renovated).

.2 Colours will be specified at a later date by the Consultant, allow for accent walls of primary colour to some areas. Unless otherwise noted on room finish schedule, new painting will match existing colours in renovated areas.

.3 In locations where drawings and Room Finish Schedule do not call for paint or similar finish on walls and/or ceilings, the intent of this Specification is that all new work and existing surfaces in areas affected by the Work of this project, including miscellaneous metal work, shall be painted.

.4 In renovated areas, paint all affected walls in accordance with the paint systems specified. All other walls in the same room are to be cleaned, prepared, and repainted, unless specified otherwise. If finish schedule indicates that new colours will be required, existing walls will require a prime coat and of two coats of finish paint. If more than one colour is present, or called for, in the room, confirm colours with Consultant.

.5 Work includes:

- .1 testing of substrates for adhesion, moisture and alkalinity
- .2 surface preparation of substrates as required for acceptance of paint, including sanding, cleaning, small crack repair, patching, caulking, and making good surfaces
- .3 recoatability testing
- .4 pre-treatments, sealing, and priming of surfaces
- .5 painting of existing and new surfaces in accordance with specified systems
- .6 provision of adequate ventilation and safe working conditions
- .7 clean up and protection

.6 Paint all new surfaces which normally require painting, including hollow metal doors and frames screens.

.7 Perform interior painting called for in Room Schedules and Door Schedule and noted on drawings. Paint all new walls, ceilings, bulkheads, tectum, and all surfaces which normally receive a paint finish, whether noted on schedules, or not noted. Walls shall be completely painted before installation of surface mounted items.

.8 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.

.9 For special painted graphics, colour changes, accent stripes, etc. see drawings.

.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 new exposed structural steel and mechanical ducts in finished areas. Paint new items to match existing. Where colour change is required schedules, repaint existing structural steel and ducts also.

.12 Paint all new exposed structure and metal deck.

.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 entirely, including all top and bottom edges, of all wood doors.

.19 Interior of ducts and diffusers visible from exterior on room side.

.20 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 work to material manufacturer's instructions and to the most recent edition of the Master Painters Institute (MPI) Maintenance Repainting Manual and Architectural Painting Specification Manual. 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, under the Canadian Environmental Protection Act, 1999, and the VOC limits set therein.

1.4 QUALITY ASSURANCE

.1 The Painting Subcontractor must be a member in good standing of the Ontario Painting Contractors' Association.

.2 Painting Subcontractor shall have a minimum of five (5) years documented successful experience with projects of a similar type and scope. When requested to do so by the Consultant, provide references confirming satisfactory performance of work on such projects.

.3 Painting crew shall be composed of experienced, qualified journeypersons. Apprentices may undertake work only when fully supervised by senior, qualified workers.

.4 All painting and coating products shall be as listed in the current Approved Product List published by the Master Painter's Institute (MPI).

.5 Materials, surface preparation and workmanship shall conform to the latest edition of the MPI Maintenance Repainting Manual and Architectural Painting Specifications Manual.

.6 The Painting Subcontractor shall inspect all surfaces requiring repainting and shall notify the Consultant and Contractor, in writing, of any defects or problems, prior to commencing repainting or after preparation work. Commencement of work will infer acceptance of existing conditions.

.7 Where special coatings or decorating systems (i.e. textured coatings or non-MPI listed products or systems) are to be used in repainting, provide certification from the paint manufacturer of all surfaces and conditions for application of the specific paint or coating system. Arrange and pay for field inspection by the manufacturer and their approval of their paint or coating system application, at no additional cost to the Owner. Submit manufacturer's inspection reports and approvals to the Consultant.

.8 Standard of Acceptance:
- .1 For interior work, surfaces will be viewed using full final lighting in the space. For exterior work, surfaces will be viewed at time of peak sunlight exposure to the subject surface.
- .2 Walls shall exhibit no defects when viewed from a distance of 1000 mm at a 90°angle.
- .3 Ceilings and soffits shall exhibit no defects visible from grade at 45°angle to surface.
- .4 Final coat shall be uniform in colour and sheen across the entire surface area.

1.5 WORK ENVIRONMENT

.1 Do not apply paint finish in areas where dust is being generated. Apply paint only to dry, clean, properly cured and adequately prepared surfaces.

.2 Maintain environmental conditions within limits recommended by manufacturer, for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

.1 Do not perform painting or decorating work when the ambient air and substrate temperatures are below 10°C, for both interior and exterior work.

.2 Maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.

.3 Provide adequate, continuous ventilation during work and for at least one week after completion of painting.

.4 Provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.5 For exterior work, provide suitable weatherproof enclosure and sufficient heating facilities where required to provide suitable environmental conditions for painting.

.6 Do not perform painting or decorating work when the relative humidity is above 85% or when the dew point is less than 3°C variance between the air/surface temperature.

.7 Test concrete, masonry, plaster, and wood surfaces for moisture and alkalinity.

.1 Do not do painting or decorating work when the maximum moisture content of the substrate exceeds 15% for wood, or 12 % for concrete, masonry, plaster, and gypsum board.

.3 Work areas shall be well illuminated during painting work. Do not perform work unless a minimum lighting level of 323 Lux (30 foot candles) is provided on surfaces to be painted or repainted.

.4 Conform to requirements of MPI Maintenance Repainting Manual and Architectural Specification Manual.

1.6 **INSPECTION AND ACCEPTANCE OF EXISTING CONDITIONS**

.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 Examine the conditions of existing surfaces to be repainted and evaluate with respect to MPI's Maintenance Repainting Manual. This includes the following:

.1 check thickness and adhesion of existing coatings. Perform adhesion tests on existing surfaces where existing coatings are peeling, flaking, or showing signs of delamination.
.2 determine what type of paint products were used previously
.3 assess defects in existing coatings
.4 Determine the degree of surface degradation. Refer to MPI guidelines for accessing levels of surface degradation.

.4 Notify the Consultant, in writing, immediately if any existing condition is encountered that will prevent the attainment of satisfactory results in this work.

.5 Existing paint materials used in the building may not be compatible with new materials specified for the surface types in some cases. This includes surfaces that may be coated with alkyd paints. Additionally, encapsulation of old lead paint may be required. Review hazardous materials report to determine if any lead based paint is known to be present in the building.

1.7 **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 a list of all paint materials for review by Consultant, prior to ordering materials.

.3 Submit manufacturer's data sheets for each paint product to be used on the project, including:
- .1 MPI approved product number
- .2 Product characteristics
- .3 Surface preparation instructions and recommendations
- .4 Primer requirements and finish specifications
- .5 Storage and handling recommendations
- .6 Application methods
- .7 Cautions
- .8 VOC data

.4 Submit WHMIS Material Safety Data Sheets (MSDS) for all paint/coating materials.

.5 Submit list of all paint brand names and colour formulas used on the job. This can be a sheet containing copies of the labels added to the paint containers at time of purchase.

.6 Submit written confirmation of acceptance of existing conditions, as specified above, or an assessment of existing conditions noting all problematic areas.

.7 When repainting occupied areas, submit work schedule for staging of work for the Consultant's review and Owner's approval, as noted above.

.8 Submit a receipt for maintenance materials required to be provided to Owner; receipt to be signed by building Custodian.

1.8 **STORAGE AND HANDLING**

.1 Store paint and painter's materials in clean, dry, well ventilated 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 compliance with applicable standards,
.6 batch date, and
.7 colour name and number.

.3 Provide CO_2 fire extinguisher minimum 9 kg capacity in paint storage area.

.4 Handle, store, use and dispose of flammable and combustible materials in accordance with the Ontario Fire Code and to requirements of Authorities Having Jurisdiction.

.5 Do not permit contaminants to enter waterways, sanitary or storm drain systems, or into ground. Adhere to the following 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 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.

.6 Dispose of materials in accordance with the requirements of authorities having jurisdiction. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility. Empty paint cans are to be dry prior to disposal or recycling.

1.9 **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.

1.10 **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 paint application.

.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.

1.11 **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'.

1.12 **TEST AREA**

.1 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.

.2 Prior to any painting being started, request a meeting on Site between Consultant, Contractor, and Subcontractor to review conditions, surfaces, anticipated problems and to clarify quality of workmanship acceptable to Consultant.

.3 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.

.4 Retain test area until after completion of Work. Test area to be minimum standard for the Work.

.5 Failure to comply with the above will be cause for Consultant to request all Work previously painted to be repainted.

1.13 **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 Store materials where directed by Owner’s representative on site. Obtain receipt, signed by building custodian and listing all maintenance materials provided, and submit to Consultant.

1.14 **WARRANTY/GUARANTEE**

.1 Furnish a 100% Maintenance Bond, valid for **two (2) years** from date of Substantial Performance, or from date of completion of Work if work is not complete at date of Substantial Performance.

.2 Subcontractor’s Maintenance Bond, shall warrant that the work has been performed in accordance with the standards and requirements of the MPI Maintenance Repainting Manual and Architectural Painting Specification Manual, most recent editions.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint and finishing materials shall be the highest grade, first line quality, low VOC products, included on the MPI Approved Product List under the MPI reference numbers specified herein and as manufactured by Benjamin Moore & Company. Paint surfaces noted with products identified below:

.1	New Concrete Block Primed with:	Super Spec Latex Block Filler (K160)
.2	Metal and Glazed Surfaces Primed with:	Fresh Start All-Purpose 100% Acrylic Primer (K023)
.3	Classrooms & all other areas not specified herein:	Regal Select WB Semi-Gloss (K551)
.4	Interior Trim:	Regal Select WB Semi-Gloss Finish (K551)
.5	Millwork:	Regal Select WB Semi-Gloss Finish (K551)
.6	Exterior Doors & Trim:	Rust Cat Polyurethane Enamel - Gloss Finish (31)
.7	Ceilings:	Moores Latex Ceiling Paint (K258)
.8	Natural Wood:	Stays Clear Acrylic Urethane Satin Finish (K422)
.9	Hallways:	Regal Select WB Semi-Gloss Finish (K551)
.10	Lockers:	D.T.M. Acrylic Semi-Gloss (KP29)
.11	Washrooms & Toilet Partitions:	D.T.M. Acrylic Semi-Gloss (KP29)
.12	Gymnasiums & Change Rooms:	Regal Select WB Semi-Gloss Finish (K551)
.13	Cafeterias:	Regal Select WB Semi-Gloss Finish (K551)
.14	Green Screens:	Chroma Key Green

.2 Approved alternate materials include:

.1	Para Paints:	Superstick Acrylic Primer-sealer	777
		Essence Acrylic Latex Semi-Gloss	6300 series
		Ultra Interior Latex Flat Ceiling Paint	976
		Woodcare Clear Interior Acrylic Satin	V190
		Specialty Interior/Exterior Latex Flat Block Filler	5792
		Ultra Door & Trim Latex Semi-Gloss	4900 series

.3 Paints, enamels, fillers, primers, varnishes and stains shall be ready mixed products of one of the manufacturers listed. Substitutes will not be allowed. The only exception to this is where a specific product of another manufacturer is specified herein; such products shall be provided as specified. Paint products shall have minimum 40% volume solids.

.4 All paints shall be ready-mixed and pre-tinted. Thoroughly re-mix all paint in containers prior to and during application to ensure break-up of lumps and uniformity of colour and gloss.

.5 Thinners, cleaners - type and brand recommended by the paint manufacturer

.6 Only products manufactured by paint manufacturer stated at time of submission of samples will be allowed on Site unless other materials specifically specified herein or otherwise approved. No painting to be performed until paint manufacturer is identified and acceptance received from the Consultant.

.7 Where available, paint products shall meet MPI Environmentally Friendly E3 ratings for VOC content.

.8 All materials and paints shall be free of lead and mercury, shall conform to Canadian Regulations for VOC limits, and shall meet flame spread and smoke developed limits required by code.

.9 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 In each room, the Consultant may select one wall where an accent colour may be applied.

.3 Refer to room finishing notes for detailed instructions.

PART 3 - EXECUTION

3.1 **PREPARATION - GENERAL**

.1 Remove existing hardware and surface fittings, fastenings, plates, mechanical louvers, door and window hardware removable rating / hazard / instruction labels, washroom accessories, light fixture trim, signage, etc., from walls, ceilings, doors and frames, prior to repainting and replace upon completion. Clean all items, wrap carefully, fully labelling each package, and store on site for reinstallation at completion of the work. Do not use solvent or reactive cleaning agents on items which may mar or lose finishes.

.2 Protect all adjacent interior surfaces, equipment, and furnishings to remain in work areas, including rating and instruction labels on doors, frames, piping, etc., from repainting operations and damage by use of drop cloths, shields, masking, templates, or other suitable methods. Make good any damage caused by failure to provide adequate protection.

3.2 **PREPARATION OF SURFACES**

.1 Prepare surfaces in accordance with the following standards and to MPI Maintenance Repainting Manual and Architectural Specification Manual; the most stringent requirements shall apply.

.2 Existing Surfaces:

.1 Refer to the MPI Maintenance Repainting manual for the levels of surface degradation and the corresponding surface preparation requirements and recommended repaint systems. Prepare existing surfaces as recommended for the finish required.

.2 Remove all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mould, mildew, mortar, efflorescence, smoke stains, sap, and sealers from existing surfaces to assure sound bonding to tightly adhering old paint.

.3 Scape peeling paint off existing masonry surfaces and apply a compatible masonry sealer, approved for use by the paint manufacturer, before applying new coatings.

.4 Glossy surfaces must be clean and dull before repainting. Wash with abrasive cleanser, or, wash thoroughly and dull by sanding. Use full coat of bonding primer below finish coats.

.5 Where smoke and water stains cannot be adequately removed by cleaning, provide stain blocking primer over affected areas.

.6 Spot prime any existing bare areas with an appropriate primer.

.3 New Surfaces:

.1 Prepare wood surfaces to CGSB 85-GP-IM. 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 Test coat concrete surfaces to ensure adhesion of primer prior to proceeding with painting. If concrete contains fly ash, a solvent based primer will be required.

.6 Prepare wallboard surfaces to CGSB 85-GP-33M. Fill minor cracks with plaster patching compound for stained woodwork.

.7 Prepare concrete floors to CGSB 85-GP-32M.

.8 Prepare copper piping and accessories to CGSB 85-GP-20M.

.9 Apply prime coat on wood scheduled for paint finish before installation.

.10 Back prime wood scheduled for transparent finish. Do not prime surfaces scheduled for transparent finish.

.4 Coat test areas to confirm adhesion of all coatings over pipe insulations and plastics prior to proceeding with painting.

.5 NOTE: ABOVE NOTED SURFACES MAY NOT ALL BE APPLICABLE TO THIS PROJECT.

3.3 RECOATABILITY TESTING

.1 Perform a minimum of ten (10) reocoatability tests at existing surfaces to be repainted as outlined below. Testing of interior surfaces must be performed in the presence of the Consultant.

.2 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.

.3 Clean and prepare test areas of the surface to be repainted. Areas selected shall be areas of the surfaces most vulnerable to weathering and/or wearing.

.4 Repeat the recoatability testing until satisfactory results are obtained.

3.4 FINISHING SYSTEMS

.1 Finishing systems specified below are based on the repainting and new painting systems included in the MPI manuals. Painting in renovated areas consists of repainting of existing surfaces and painting of new surfaces.
- .1 RIN and REX formulas are found in the Maintenance Repainting Manual and apply to repainting work.
- .2 INT and EXT formulas are found in the Architectural Painting Specification Manual and apply to new painting work.
- .3 Finishing systems are to be modified where indicated below.
- .4 Finishes must be low VOC products; use paint products meeting MPI Environmentally Friendly E3 ratings, where such products are available in Ontario.
- .5 All finishing systems shall be Premium Grade.

.2 Existing surfaces to be repainted are to be primed in accordance with MPI Maintenance Repainting Manual recommendations for the degree of surface degradation, as follows:
- .1 DSD-1: Touch-up
- .2 DSD-2: Spot prime
- .3 DSD-3: Full prime coat
- .4 DSD-4: After repair by others, full prime coat

.3 Bonding Primer:
- .1 Where existing surfaces are coated with different coating types than they are specified to receive, including old alkyd paints, glazed coatings, epoxies, etc., or where surfaces are inherently slick or glossy, use a full prime coat of bonding primer before applying new finish coats.
- .2 All existing surfaces, including metal doors, frames and screens shall receive a full coat of bonding primer before repainting.
- .3 Bonding primer shall be MPI #17 X-Green, or MPI #17 within VOC range E3, selected as appropriate for the substrate and new coating.

.4 Interior Work:

.1 Drywall and Plaster:

.1 Walls: High Performance Architectural Latex, semi-gloss finish

.1 RIN 9.2B - G5, for repainting work:
.1 Bonding primer: MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level
.3 2 coats HIPAC Latex; MPI #141, VOC Range E3

.2 INT 9.2B - G5, for new painting work:
.1 1 coat Latex Primer Sealer; MPI #50, VOC Range E3
.2 2 coats HIPAC Latex; MPI #141, VOC Range E3

.2 Ceilings: Latex (over latex sealer), flat finish

.1 RIN 9.2A - G1, for repainting work:
.1 Bonding primer: MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level
.3 2 coats MPI #53; VOC Range E3

.2 INT 9.2A - G1 for new painting work:
.1 I coat Primer; MPI #50
.2 2 coats MPI #53; VOC Range E3

.3 All new drywall, whether requiring finish painting or not, must receive prime coat.

.2 Concrete Block, paint: High Performance Architectural Latex, semi-gloss finish

.1 RIN 4.2D - G5 (modified) for repainting work
.1 1 coat bonding primer; MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level
.3 2 coats finish; MPI #141, VOC Range E3

.2 INT 4.2D - G5 (modified) - 4 coat system, for new painting work
.1 2 coats latex blockfiller; MPI #4
.2 2 coats finish; MPI #141, VOC Range E3

.3 Concrete Block, glaze: Epoxy-modified Latex Finish, gloss

.1 RIN 4.2F - G6 (modified) for repainting work
.1 1 coat bonding primer; MPI #17 X-Green
.2 2 Coats epoxy-modified latex finish; MPI #115

.2 INT 4.2J - G6 (modified) - 4 coat system, for new painting work
.1 2 coats latex blockfiller; MPI #4
.2 2 Coats epoxy-modified latex finish; MPI #115

.3 Provide in all hallways and washrooms, and where noted as "glazed" in Room Finish Schedule.

.4 Concrete Block, wet areas: Epoxy, Gloss; "Tile like" Finish

.1 RIN 4.2D for repainting work
- .1 1 coat bonding primer; MPI #17. VOC Range E3
- .2 2 Coats epoxy finish; MPI #77, VOC ≤250 g/L

.2 INT 4.2G (modified) 4 coat system for new painting work
- .1 2 coats epoxy blockfiller; MPI #116, VOC Range E3
- .2 2 Coats epoxy finish; MPI #77, VOC ≤250 g/L

.3 Provide in all wet areas, including washrooms.

.5 Cast in Place Concrete

.1 walls: High Performance Architectural Latex, semi-gloss finish

.1 RIN 3.1J - G5 for repainting work
- .1 Bonding primer: MPI #17 X-Green
- .2 Where bonding primer is not required, prime as required by DSD level
- .3 2 coats HIPAC Latex finish; MPI #141, VOC Range E3

.2 INT 3.1C - G5 for new painting work
- .1 1 coat alkali resistant primer; MPI #3
- .2 2 coats HIPAC Latex finish; MPI #141, VOC Range E3

.2 ceilings: High Performance Architectural Latex, low sheen finish

.1 RIN 3.1J - G2 for repainting work
- .1 Bonding primer: MPI #17 X-Green
- .2 Where bonding primer is not required, prime as required by DSD level
- .3 2 coats HIPAC Latex finish; MPI #141, VOC Range E3

.2 INT 3.1C - G2 for new painting work
- .1 1 coat alkali resistant primer; MPI #3
- .2 2 coats HIPAC Latex finish; MPI #141, VOC Range E3

.3 For concrete mixes containing fly ash, primer shall be alkali resistant solvent based primer MPI #223 or, on cured concrete, solvent based bonding primer MPI #69. Confirm suitability of primer for substrate, with product manufacturer.

.6 Woodwork - Opaque Finish: High Performance Architectural Latex, semi-gloss finish

.1 RIN 6.3T for repainting work
- .1 prime as required by DSD level; MPI #39
- .2 2 coats HIPAC latex finish; MPI #141. VOC Range E3

.2 INT 6.4S for new painting work
.1 1 coat latex primer MPI #39
.2 2 coats HIPAC latex finish; MPI #141. VOC Range E3

.7 Woodwork - Polyurethane Varnish over Semi-transparent Stain, gloss

.1 RIN 6.3E - G6 for repainting work
.1 stain as required by DSD level; MPI #90
.2 2 coats Polyurethane Varnish, clear gloss; MPI #56

.2 INT 6.3E - G6 for new painting work
.1 Wood Stain; MPI #90
.2 3 coats Polyurethane Varnish, clear gloss; MPI #56

.8 Ferrous Metal: W.B. Light Industrial Coating, semi-gloss finish

.1 RIN 5.1P- G5 for repainting work
.1 Bonding primer: MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level; MPI #101
.3 2 coats W.B. light industrial coating; MPI #153

.2 INT 5.1N - G5 for new painting work
.1 1 coat epoxy primer; MPI #101
.2 2 coats W.B. light industrial coating; MPI #153

.9 Shop Primed Structural Steel and Metal Fabrications (New work):

.1 Confirm type of shop primer used with structural steel supplier, and use compatible system listed below.

.2 Confirm compatibility of all coatings with manufacturers.

.3 Touch up prime coat where damaged, with compatible primer.

.4 Over Q.D. metal primer: High Performance Architectural Latex, semi-gloss finish
.1 INT 5.1R - G5, for new painting work
.1 1 coat Alkyd metal primer MPI #79; VOC Range E2 or E3
.2 2 coats HIPAC Latex; MPI #141; VOC Range E3

.5 Over epoxy primer: W.B. Light Industrial Coating, semi-gloss finish
.1 INT 5.1N - G5, for new painting work
.1 1 coat epoxy primer; MPI #101
.2 2 coats W.B. light industrial coating #153

.10 Galvanized Metal: High Performance Architectural Latex, semi-gloss finish

.1 RIN 5.3J - G5 (over anti-corrosive alkyd primer)for repainting work
.1 Bonding primer: MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level; MPI #134

.3 2 coats HIPAC Latex MPI #141; VOC Range E3

.2 INT 5.3M for new painting work
.1 1 coat water based Galvanized Primer MPI #134
.2 2 coats HIPAC Latex MPI #141; VOC Range E3

.11 Hollow Metal Doors, Frames, and Screens: High Performance Architectural Latex, semi-gloss finish

.1 RIN 5.3J - G5 (modified) for repainting work
.1 1 coat of bonding primer MPI #17 X-Green
.2 2 coats of HIPAC Latex MPI #141; VOC Range E3

.2 INT 5.3M - G5 for new painting work
.1 1 coat water based Galvanized Primer MPI #134
.2 2 coats HIPAC Latex MPI #141; VOC Range E3

.12 Insulation on Pipes & Ducts (plastic): High Performance Architectural Latex, semi-gloss finish
.1 RIN 6.8A - G5, for repainting work
.1 1 coat Bonding Primer MPI #17 X-Green
.2 2 coats HIPAC Latex MPI #141; VOC Range E3

.2 INT 6.8A - G5, for new painting work
.1 1 coat Bonding Primer MPI #17 X-Green
.2 2 coats HIPAC Latex MPI #141; VOC Range E3

.13 Mechanical Equipment:
.1 High Performance Architectural Latex, semi-gloss finish
.2 As specified for metal types.
.3 Use heat resistant paint where required.

.14 Piping, Conduit & Ductwork (uncoated): High Performance Architectural Latex, semi-gloss finish
.1 RIN 5.3J - G5, for repainting work
.1 1 coat of bonding primer MPI #17 X-Green
.2 2 coats of HIPAC Latex MPI #141; VOC Range E3

.2 INT 5.3M - G5, for new painting work
.1 1 coat water based Galvanized Primer MPI #134
.2 2 coats HIPAC Latex MPI #141; VOC Range E3

.15 Surfaces behind grilles, within 30mm of grille: Institutional Low Odour/ Low VOC, flat finish
.1 RIN 5.3K - G1, for repainting work
.1 Bonding primer: MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level; MPI #134
.3 2 Coats Acrylic Flat, Black; MPI #143

.2 INT 5.3N - G1, for new painting work
.1 1 coat galvanized Primer MPI #134
.2 2 Coats Acrylic Flat, Black; MPI #143

.16 Concrete Floors: Alkyd Floor Enamel, gloss

.1 RIN 3.2B for repainting work
.1 Bonding primer: MPI #17 X-Green
.2 Where bonding primer is not required, prime as required by DSD level; MPI #27
.3 2 Coats Alkyd Floor Enamel, MPI #27

.2 INT 3.2B for new surfaces
.1 3 Coats Alkyd Floor Enamel, MPI #27

.17 Thermoplastic Rubber Wall Base: High Performance Architectural Latex, semi-gloss finish
.1 INT 6.8A - G5
.1 1 coat s.b. bonding primer MPI #69
.2 2 coats HIPAC Latex MPI #141

.5 Exterior Work

.1 Stucco, cementitious panels: High Performance Architectural Latex (over W.B. alkali-resistant primer), low sheen
.1 REX 9.1 K -G3, for repainting work
.1 Prime as required by DSD level; Alkali Resistant Acrylic Primer MPI #3
.2 2 Coats Latex MPI #315

.2 New stucco: not painted (integral colour); refer to Section 09 29 00

.2 Galvanized Steel: W.B Light Industrial Coating (over cementitious primer), semi-gloss

.1 REX 5.3G for repainting work
.1 Over non-compatible coatings, 1 full coat bonding primer
.2 or, over compatible epoxy coatings, prime as required by DSD level; MPI #101
.3 2 Coats Exterior W.B Light Industrial Coating MPI #163

.2 EXT 5.3G for new painting work
.1 Touch-up welds and any repairs
.2 1 coat Cementitious Primer MPI #26
.3 2 Coats Exterior W.B Light Industrial Coating MPI #163

.3 Ferrous Metals, Structural Steel: W.B. Light Industrial Coating over rust inhibitive primer, semi gloss
.1 REX 5.1K - G5, for repainting work
.1 Over non-compatible coatings, 1 full coat bonding primer
.2 or, over compatible coatings, prime as required by DSD level; MPI #107
.3 2 Coats Water Based Light Industrial Coating MPI #163

.2 EXT 5.1M - G5, for new painting work
.1 1 coat Rust Inhibitive Primer MPI #107
.2 2 Coats Water Based Light Industrial Coating MPI #163

.4 NOTE: Touch up shop primer and field welds using zinc rich primer.

.5 Wood: Solid Colour Stain

.1 REX 6.2D for repainting
.1 Over non-compatible coatings, 1 full coat bonding primer
.2 or, over compatible coatings, prime as required by DSD level; MPI #5
.3 2 Coats Exterior Solid Colour Stain MPI #14

.2 EXT 6.2D for new painting work
.1 1 Coat Exterior Alkyd Primer MPI #5
.2 2 Coats Exterior Solid Colour Stain MPI #14

.6 For painted markings on asphalt paving refer to Section 32 17 23.

3.5 **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 Do not commence repainting unless substrates are acceptable and until all environmental conditions (heating, ventilation, lighting and completion of other subtrade work, if applicable) are acceptable for application of products.

.5 Allow appropriate time between surface cleaning and commencement of painting work to permit surface conditions to be ready for coating work, and to prevent re-contamination of surfaces.

.6 Apply primers, paints, and stains in accordance with the Premium Grade finish requirements of the MPI Painting and Repainting manuals.

.7 Apply bonding primer over existing coatings and glossy substrates, as specified above.

.8 Number of coats specified is to be considered a minimum. Where deep or bright colours are required, apply a minimum of four coats and as required to achieve satisfactory results. This will include at accent walls in kindergarten classrooms and child care rooms.

.9 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.

.10 Sand and dust between each coat to provide an anchor for next coat and to remove defects in previous coat (runs, sags, etc.) visible from a distance up to 1000 mm.

.11 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.

.12 To avoid air entrapment in applied coats, apply materials in strict accordance with manufacturer's spread rates and application requirements.

.13 Give Consultant 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.

.14 At concrete block, two coats of block filler are required to achieve smooth and uniform surface on block.

.15 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.

.16 Use paint unadulterated. Use same brand of paint for primer, intermediate and finish coats. Factory mix all paints.

.17 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.

.18 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.

.19 Paint entire surfaces, including areas where millwork or other items are to be installed.

.20 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.

.21 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.

.22 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.

.23 After first coat, fill nail holes, splits and scratches, using putty coloured to match finish.

.24 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.

.25 Clean castings with wire brush before application of first paint coat.

.26 Do not etch galvanized metal. Use zinc rich primer. This includes metal door frames and the like with wiped zinc coating.

.27 Note that bonding primer is required on all existing hollow metal doors, frames and screens to be repainted. A full coat of primer is required on all new hollow metal doors, frames and screens. Three coat system is required in all cases. Sand between all coats.

.28 Remove form oil or parting compounds from concrete surfaces. Use Xylol or approved compound.

.29 Paint interior of pipe spaces, ducts, etc. visible through grilles or through linear metal ceilings in black matt finish.

.30 Conform with Consultant's colour schedule and exactly match approved samples.

.31 Mechanical and Electrical Pipes, Ducts and Conduits:

.1 Commence Work when new piping installation is complete in the area concerned.

.2 Unless otherwise noted, repainting shall also include exposed to view / previously painted mechanical and electrical equipment and components (panels, conduits, piping, hangers, ductwork, etc.). Leave unfinished exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish.

.3 Touch up scratches and marks and repaint such mechanical and electrical equipment and components with colour, and sheen finish to match existing unless otherwise noted or scheduled.

.4 Do not paint plated or other prefinished surfaces, unless otherwise noted.

.5 Do not paint over name plates or instruction labels.

.6 Keep repainted sprinkler heads free of paint.

.7 Paint conduit in same colour as background paint.

.8 Apply formulae specified even with new items surface prime painted at shop prior to delivery. Touch up shop priming where damaged.

.9 Use heat resistant epoxy paint on pipes and surfaces where operating surface temperature exceeds 65 degrees C.

.10 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 23 for further instructions.

.32 Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

.33 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

3.6 COLOUR CODING OF PIPING

.1 Paint exposed conduits, pipes, hangers and other mechanical electrical items occurring in finished areas. Colour to match adjacent surfaces except where otherwise required for identification.

.2 Paint exposed pipes in mechanical rooms as per piping colouring code:

Domestic Hot Water	Ford Blue - 819
Domestic Hot Water Recirculating	Safety Blue - 784
Domestic Cold Water	Visa Green - 441
Hot Water Heating Feed	Safety Orange - 021
Hot Water Heating Return	Sand - 176
Gas Lines	Safety Yellow - 343
Oil Lines	Battelship Gray - 1602
Air Lines	Brown - 1134
Steam Lines	Safety Red - 1315
Condensate Return	Peach - 1178
Fire Lines	Safety Green - 581
Glycol Feed Lines	Purple - 1398
Glycol Return Lines	Safety Black - 80
Condensed Water	Boiler Blue - 826
Chilled Water Supply	Mauve - 1371

All colours are Benjamin Moore Metal & Wood Alkyd Enamel (K133).

3.7 CLEAN-UP AND PROTECTION

.1 Replace and reinstall all items previously removed and stored upon completion of repainting work in each area.

.2 Protect all newly painted exterior surfaces from rain and snow, condensation, contamination, dust, salt spray and freezing temperatures until paint coatings are completely dry. Curing periods shall exceed the manufacturer's recommended minimum time requirements.

.3 Erect barriers or screens and post signs to warn, limit or direct traffic away or around work area as required.

.4 Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

.5 Clean equipment and dispose of wash water and solvents as well as all other cleaning and protective materials, paints, thinners, paint removers/strippers in accordance with the environmental and safety requirements of authorities having jurisdiction.

3.8 **REPAIRS**

.1 Cracks occurring in walls or ceilings requiring patching during the Warranty Period shall be repainted in such a way that the patch is not visible at a distance of 1m.

.2 Patch painting is not acceptable, repaint entire wall, or ceiling.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Anti-slip, heavy-duty, two component epoxy coating for colour contrasting bands at front edge of contrasting bands on concrete ramps, and at other locations where a painted anti-slip concrete surface is indicated on drawings.

1.2 RELATED WORK

.1	Concrete	Section 03 30 00
.2	Painting	Section 09 90 00
.3	Concrete Paving and Curbs	Section 32 13 13

1.3 SUBMITTALS

.1 Submit two 200 x 200mm colour samples of top coat material, in colour selected by Consultant.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in original containers with manufacturer's labels and seals intact, stored off the ground in a dry lockable area, with temperature above 0°C and below 38°C, until surfaces are ready for application.

.2 Refer to manufacturer’s instructions for storage and handling, including environmental requirements.

1.5 PROTECTION

.1 Obtain complete information on health and safety precautions from manufacturer and follow such precautions, in compliance with local health, safety and environmental regulations and standards.

.2 Mask to provide neat, clean, true juncture lines with no marring of adjacent surfaces. Provide rip-proof plastic tarps for protection of adjacent surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Anti-Slip Coating:
- .1 Top Coat: Anti-Slip High Performance Epoxy; AS-250 Non-slip floor and deck coating by American Safety Technologies
- .2 Primer: PS-100 WB two-component epoxy sealing primer by American Safety Technologies
- .3 Colour to be selected by the Consultant; assume Safety Yellow will be chosen.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Inspect surfaces to receive coating and advise Consultant if any conditions may interfere with the successful application of coating to achieve the required slip resistance, colour contrast, and a quality finish appearance.

.2 Allow new concrete to cure for at least 30 days prior to application of coatings. Remove form release agents, hardeners and sealers, as these will interfere with adhesion of the coatings.

.3 Remove oil, grease, dirt, wax, and other such contaminants, by dissolving with a commercial grade cleaner/degreaser. Flush area thoroughly with clean water and allow to dry.

.4 Proceed with exterior applications only if the air and surface temperature is greater than 10°C.

.5 Where applicable, apply coatings before adjacent work is painted.

.6 Mask areas to be painted to create straight, clean edges, and protect adjacent surfaces.

.1 Provide 50mm wide contrasting band along the full leading edge of each stair tread and landing edge. Painting shall be done after other work at stairs is complete, including installation of railings and tactile attention indicators.

.7 Mix and apply all coatings in strict accordance with manufacturer's instructions.

.8 Prime concrete surface with Water-based Primer.

.9 Apply top coat, in colour selected by the Consultant, using a phenolic roller. Ensure the roller exposes the maximum amount of non-slip aggregate, to ensure the coated surface will not become slippery when wet.

.10 Finish shall match approved sample in colour saturation; provide an additional coat if required to match sample.

.11 Upon completion remove masking and clean coating from adjacent surfaces.

.12 Protect exterior applications from rain for minimum 12 hours, and up to 24 hours depending on humidity levels, after application. Protect from excessive exposure to water, oil and chemicals for 5 to 7 days.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Concrete Unit Masonry	Section 04 22 00
.2	Rough Carpentry	Section 06 10 00
.3	Integrated Smart Boards	Section 10 12 00

1.2 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 01 33 23. Indicate field dimensions on shop drawings.

.2 Shop drawings to show sizes, types, layouts, and installation details.

.3 Submit samples of visual display boards as requested by the Consultant.

.4 Include copies of trade literature, outlining the care and maintenance of the installation, in Maintenance Manual.

1.3 STORAGE

.1 Deliver units fully assembled to the maximum extent practical.

.2 Store all materials within the building in clean, dry area, and in accordance with manufacturer's recommendations.

.3 Store material in manner which will not damage, mark or cause other defects detrimental to the finished appearance. Provide such protection as necessary to guard against damage and marring from this and other trades. Maintain such protection until ordered removed by the Consultant.

1.4 WARRANTY

.1 Extend the Warranty period stipulated in the General Conditions of the Contract to **two (2) years**.

.2 Writing boards shall carry a **25 year** warranty against defects appearing under regular classroom usage and wear. All Warranties to be given in writing.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Materials listed herein are as manufactured by ASI Visual Display Products (Architectural School Products). Equivalent products as manufactured by Martack Specialties Ltd. or Global School Products Inc. are acceptable.

.2 Markerboards and tackboards are to be of sizes indicated on drawings.

.3 Standard Aluminum Trim to be A.S.P. Series 200, as follows:

.1 Perimeter Trim: No.205

.2 Map Rail with Cork Insert: No.206

.3 Dividerstrip: No.207

.4 Marker/Chalk tray: No. 212, complete with end pieces

.5 Marker tray over millwork: No. 264, where mounted on or directly above millwork

.4 All exposed aluminum to have clear anodized satin finish.

.5 Furnish map rails, complete with hooks at the rate of two hooks every 1200mm. of rail.

.6 Markerboards:
.1 White, eraseable, writing board for markers.
.2 12mm thickness composed of white ceramic surface fused under high heat to a high quality steel surface, with 11mm impregnated tentest core, with balancing zinc coated steel back-up sheet.
.3 Markerboard surface shall be flat, without deflection or warping.

.7 Joints to be absolutely flush and level, plumb and true with edges finished square and fitted as closely as possible. Use concealed joint fasteners.

.8 Tackboards: 12.7mm thick A.S.P. Prelaminated tackboards, consisting of 6.35mm natural cork laminated to 6.35mm hardboard backing, to sizes as shown on Drawings.

.9 Mounting heights of marker boards and tackboards shall be confirmed by user.

.10 In addition to items indicated on drawings, supply and install additional display boards as follows:
.1 Four (4) 1200 x 1200mm markerboards,
.2 Six (6) 1200 x 1200 tackboards.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Supply all labour, materials, anchors, fasteners necessary to complete the installation of markerboards, and tackboards throughout the project. All installations to be done by tradesmen experienced in this type of work.

.2 Erect all units plumb, level and accurately in locations shown on the Drawings or as directed by Consultant. Securely and permanently fix to the wall surfaces with concealed fasteners.

.3 Install markerboards and tackboards with concealed fasteners so that they will be removable, without damage, for future relocation. Provide sufficient fasteners so that the boards stay rigid and tight to walls, without deflection or movement during use.

.4 Include for extended aluminum jambs, trim, track and marker/chalk trays and accommodate all other special conditions as required.

.5 Accurately cut, machine and fit to form tight flush hairline connections all joints in trim and rails. Corners of trim to be square and true and mitre cut. Cap ends of rails with cast aluminum end fittings.

.6 Joints in markerboards to be tight hairline flush butt joints properly alligned by means of a continuous 14 ga galvanized steel spline let into edges.

.7 Adjust all operation hardware for smooth, trouble free operation.

.8 Do not install finished materials until overhead work such as acoustic ceiling, electrical, mechanical and painting have been completed.

.9 Install extra markerboards and tackboards, specified above, where directed by Owner.

3.2 **CLEANING**

.1 Leave trim and board surfaces clean and free of stains or marks and completely cover all markerboards with "Pliofilm" immediately after installation. Remove cover at time of occupancy.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry	Section 06 10 00
.2	Custom Cabinets	Section 06 41 00
.3	Visual Display Boards	Section 10 11 00
.4	Electrical	Division 26

1.2 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 01 33 23. Indicate field dimensions on shop drawings.

.2 Shop drawings to show sizes, types, layouts, and installation details.

.3 Include copies of trade literature, outlining the care and maintenance of the installation, in Maintenance Manual.

1.3 STORAGE

.1 Deliver units fully assembled to the maximum extent practical.

.2 Store all materials within the building in clean, dry area, and in accordance with manufacturer's recommendations.

.3 Store material in manner which will not damage, mark or cause other defects detrimental to the finished appearance. Provide such protection as necessary to guard against damage and marring from this and other trades. Maintain such protection until ordered removed by the Consultant.

1.4 WARRANTY

.1 Extend the Warranty period stipulated in the General Conditions of the Contract to **five (5)** years.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Combination Projection Screen and Marker Board / Smart Boards:

.1 Supply and install wall mounted IDEA Screen combination projection screen and marker boards (smart boards) as manufactured by DA-LITE (1800-622-3737). Boards shall be Wide 16:1 format 1350 (H) x 2150 (W). Total eight (8) required.

.2 Surface shall consist of proprietary projection surface permanently bonded to magnetic substrate to allow use of dry erase markers, interactive stylus and touch interactivity. Projection surface to have a gain of 2.5 and viewing half angle of 25 degrees. Frame shall be 25mm thick with 9.5mm bezel in aluminum with silver finish. Bezel thickness at screen surface shall be 1.5mm. Screen shall be equipped complete with whiteboard mount corner supports, and large top and lower mounting brackets.

.3 Provide one case (12 bottles) of whiteboard cleaner, one pack (12 cloths) of cleaning cloths and eight sets of spare markers.

.4 The terms, "integrated smart board, interactive white board, and integrated white board" may be used interchangeably.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Supply all labour, materials, anchors, brackets, fasteners necessary to complete the installation of smart board. All installations to be done by tradesmen experienced in this type of work.

.2 Erect all units plumb, level and accurately in locations shown on the Drawings or as directed by Consultant. Securely and permanently fix to the wall surfaces with concealed fasteners.

.3 Installation of integrated smart boards shall be coordinated with the Owner and forces installing projectors above the whiteboards. Install projection whiteboards on steel brackets and as per KPRDSB standard detail 2022. Confirm installation heights with Owner.

.4 Install smart boards on steel brackets.

.5 Do not install marker tray.

.6 Co-ordinate frame support locations with gypsum board trade / carpenter.

3.2 CLEANING

.1 Leave trim and board surfaces clean and free of stains or marks.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Temporary Safety Signage	Section 01 35 20
.2	Demolition & Alterations	Section 02 40 00
.3	Temporary Project Sign	Section 01 58 00
.4	Interior Signage	Section 10 14 23

1.2 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 23.

.2 Shop drawings for all wall-mounted items and for ground sign must be sealed by a professional structural engineer, registered in the Province of Ontario, who shall be responsible for the design of the foundation for the ground sign and all mounting systems and details.

PART 2 - PRODUCTS

2.1 EXTERIOR SIGNS

.1 Provide and install metal signage and posts as required for fire route, barrier-free parking, stop direction/no entry signs, etc. Refer to Drawings.

.2 Signs to be standard international symbols and notifications. All signage must conform to municipal standards.

.3 Barrier-free signage shall conform to the requirements of O.Reg. 191/11, Integrated Accessibility Standards. Provide “Van Accessible” sign at “Type A” accessible parking spaces.

.4 Aluminum signs shall be fabricated from 2.057mm(.081") thick 5052-H38 tempered aluminum. Aluminum signs with both sides less than 600mm in length may be fabricated from 1.626mm (.064") thick 5052-H32 tempered aluminum. All aluminum to be acid etched and anodized.

.5 Posts to be set in poured concrete footings, 150mm dia. X minimum 1220mm deep.

.6 Standard fire route signs shall be installed along the route at approximately 30m intervals and as per fire route approved by the municipal Fire Department. A fire route application will be submitted to the municipality.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Deliver to site and install as per manufacturer’s instructions and drawing details; complete for final electrical connections where applicable.

.2 Coordinate to ensure all required blocking and supports are installed prior to commencing installation of the products specified herein.

.3 Clean all substrates thoroughly before commencing installation.

.4 Install work square, plumb, straight, true and accurately fitted.

.5 All letters and numbers shall be installed straight, even and level with adjacent letters and numbers. Any items that are bent are not to be used.

.6 Clean surfaces and clean up work area at completion of installation.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Coordinate and facilitate supply and installation of Interior Signage, provided under cash allowance.

.2 Interior signage will consist of room name signs for each room and, instructional and directional signs, and shall be generally as described below but subject to further instructions at a later date.

.3 Barrier-free signage is required as follows:

.1 Sign with International Symbol of Accessibility shall be installed where necessary to indicate,
.1 location of the barrier-free entrance to the building, and
.2 location of ramps located in a required barrier-free path of travel serving that entrance
.3 location of accessible means of egress from the building.

.2 Each barrier-free washroom shall be identified by a sign consisting of the international symbol of accessibility and tactile graphics and or lettering to indicate male, female, unisex, or all-gender use.

.3 Washrooms which are not barrier-free shall have signs provided to indicate the location of the barrier-free facilities.

1.2 REFERENCES

.1 CAN/CSA B651 M Barrier Free Design

1.3 SUBMITTALS

.1 Submit sign schedule listing each sign required, showing sizes, materials, lettering, numbers, colours and mounting locations and heights.

.2 Submit full size samples of each size type required using materials and colours selected.

1.4 CASH ALLOWANCE

.1 The cost of the supply and installation of interior signage will be paid through the Cash Allowance included in the Contract. Contractor's work with respect to interior signage is to be included in the Contract.

PART 2 - PRODUCTS

2.1 MANUFACTURER

.1 Interior signage shall be as manufactured and installed by Miller McConnell Signs, or equivalent manufacturer.

2.2 **MATERIALS AND FABRICATION**

.1 General:
- .1 All signs shall have non-glare background.
- .2 Letters, numbers, and pictographs must be in a contrasting shade (dark versus light) to the background, for increased visibility.
- .3 Typeface shall not be condensed or extended.
- .4 All signs shall have all information in Braille also, unless noted otherwise.
- .5 All screws shall be stainless steel, tamperproof type.

.2 Letter Style: Helvetica Medium; size to suit details.

.3 Edges and Borders:
- .1 Edges shall be slightly beveled. Signs shall typically have a border line 1.5 mm deep x 2mm wide as detailed on drawings.

2.3 **RAISED TACTILE LETTERING AND BRAILLE**

.1 All raised tactile lettering and Braille shall be as per the latest CSA Standards and Ontario Building Code requirements. Braille shall be North American Contracted (Grade 2) Braille.

.2 Relief etch Braille into cover sheet for ALL signs and logos, except Sign Type 2. The Braille shall indicate both room name and room number and be located in the bottom left of the cover sheet, and should not overlay over the standard lettering of the signage.

.3 Font for lettering to be “Helvetica Medium” and Font Size to be approximately 26mm; with first letters of words upper case and remainder in lower case.

.4 For all stair signs, in addition to providing Braille, relief etch raised tactile lettering into the cover sheet indicating stair designation and floor number (eg. Stair A2).

PART 3 - EXECUTION

3.1 **INSTALLATION**

.1 Install signs at required locations, to doors, frame or wall as directed by Consultant, level and plumb.

.2 Characters, symbols or pictographs on tactile signs shall, if wall mounted, be located not less than 1200 mm and not more than 1500 mm above the floor.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Masonry Walls	Section 04 22 00
.2	Ceramic Tile	Section 09 30 16

1.2 SUBMITTALS

.1 Submit samples of all accessories for approval by the Consultant, in accordance with Section 01 3 23.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Package accessories and label with description of contents and installation location. Each accessory to be individually wrapped complete with all fixings as required.

1.4 MAINTENANCE AND OPERATING INSTRUCTIONS

.1 Provide in Maintenance Manual, three (3) printed copies of maintenance and operating instructions of all accessories.

PART 2 - PRODUCTS

2.1 MATERIALS

.1	Stainless Steel:	Type 302 with #4 finish 0.76 ga unless otherwise noted.
.2	Steel:	in accordance with CAN/CSA G40.21 Grade 300W.
.3	Welding Materials:	in accordance with CSA W59.
.4	Hot dipped Galvanizing:	to conform to CSA-G164.

2.2 KEYING

.1 All accessories to be keyed alike. Provide six keys.

2.3 TRADEMARKS AND LABELS

.1 Trademarks and labels shall not be visible in the finish exposed surfaces.

2.4 MANUFACTURER

.1 Specified manufacturer's catalogue references establish minimum acceptable standards for Work of this Section. Products shall be as manufactured by Frost Products Ltd., American Specialties Inc., Bobrick Washroom Equipment Ltd., or Bradley Corp., unless noted otherwise.

.2 All items to be from one manufacturer, except where equivalent items are not listed.

2.5 **ACCESSORIES**

.1 Paper towel dispensers and standard toilet paper dispensers will be supplied by the Owner, for installation under this Contact.

.2 Toilet paper dispensers:

.1 at grab bars only: 2 roll horizontal bathroom tissue dispenser, polished chrome finish; Frost 150, Bobrick B-265, ASI model 0715, or Bradley 5224.

.3 Soap dispensers: Provide vertical type, "gravity fed, push button" satin finish stainless steel; Frost 708A, ASI model 0347, Bradley 6562, or Bobrick B-2111.

.4 Safety Coat Hooks: Frost Model 1150-CLRS, stainless steel safety hook, stainless steel type 304, No. 4 finish with epoxy coated hook in colour(s) to be selected by the Consultant from manufacturer's standard range.

.5 Grab Bars:

.1 Grab bars to be 1.2mm (18 gauge) stainless steel bars, 38mm diameter with heavy duty concealed mounting. Provide custom sizes where required. Provide peened finish.

.2 610mm long: ASI model 3801-24P, Frost 1001 NP-24, Bobrick B-6806.99, or Bradley 812-2

.3 750mm horizontal and 750mm vertical: ASI model 3804-M3030-P, Frost 1003 NP-30 x 30, Bobrick 6898.99-L30x30, or Bradley 812-2-057-30x30

.4 Fold-down / Swing-up grab bars:

.1 762mm long, 38mm diameter stainless steel bars, heavy duty mounting bracket.

.2 Fold-down grab bars must pull down with force of 22.2N or less and must resist a loading of minimum 1.3kN when installed.

.3 Fold-down grab bars with integral toilet paper holder:

.1 ASI model 3514-P- 25, Frost F-1055-FTS (38mm)

.4 Where two fold-down grab bars are provided, they must match in finish.

.6 Mirrors:

.1 Standard Mirror:

.1 (MIR) 460 x 760mm, with tamper resistant mounting; Frost 941-1830, ASI 0620-L, Bradley 781-18x30 or Bobrick B-165-1830.

.2 Mirrors shall be laminated glass.

.2 Tilted Mirrors (TMR):

.1 460 x 760mm, fixed tilt mirror; Frost F941-1830FT, ASI model 0535, Bradley 740, or Bobrick 293.

.2 Mirrors shall be laminated glass.

.7 Vanity Shelf: 450mm long x 125mm shelf with backsplash, Frost 950-18, Bobrick B-295x18, Bradley 755x18, or ASI model 0694-18

.8 Sanitary Napkin Disposal: Surface mounted, stainless steel receptacle; Frost F-622, ASI model 0852, Bradley 4781-15, or Bobrick B-270

.9 Sanitary Napkin and Tampon Vendor:
- .1 Surface mounted, stainless steel unit for 50¢ operation
- .2 'Thin' unit; approximately 120mm deep
- .3 Frost F-608-3, Bradley 407-11-45, or ASI 204684-9

.10 Toilet Backrest: (Custom) Frost model 1028, Bobrick B-5892 stainless steel tube with solid plastic laminate backrest. Standard backrest to be customized to suit a 400mm wide tube.

2.6 **FABRICATION**

.1 Weld, ground flush and smooth joints of fabricated components. Use mechanical fasteners only when approved.

.2 Form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal with 2 mm radius bends.

.4 Form flat surfaces without distortion. Maintain flat surfaces without scratches or dents.

.5 Paint back of components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip ferrous metal anchors and fastening devices to conform with CGSB G164.

.7 Shop assemble and package components complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to site at appropriate time for building in. Provide templates or rough-in measurements as required.

.9 Provide steel anchor plates and components for installation on studding and building framing.

.10 All exposed stainless steel edges to be hemmed.

.11 All stainless steel units to be double panned.

PART 3 - EXECUTION

3.1 **LOCATIONS**

.1 Washroom accessories to be installed as indicated on drawings and as follows:

.1 Toilet Tissue Dispenser: one per toilet, as follows:

.1 Toilet tissue dispensers shall be as supplied by the Owner, except at grab bar locations.

.2 Where mounted below grab bars, provide horizontal toilet tissue dispenser specified above.

.3 Where barrier-free facilities are provided, install toilet tissue dispensers in accordance with OBC barrier-free provisions.

.2 Soap Dispensers:

.1 one at each sink in instructional spaces,

.2 one per sink in washrooms

.3 mount dispensers to ensure drip hits lavatory and not floor.

.4 Where barrier-free facilities are provided, install soap dispensers within 610mm of edge of lavatory, with dispensing height at max. 1100mm above floor level.

.3 Paper Towel Dispenser:

.1 Install paper towel dispensers supplied by the Owner

.2 one per washroom where hand dryers are not provided

.3 one at each sink in instructional spaces,

.4 one per sink in other areas where sinks are shown, including at slop sinks.

.5 Where barrier-free facilities are provided, install paper towel dispensers within 610mm of edge of lavatory, with dispensing height at min. 900mm to max. 1200mm above floor level.

.4 Safety Coat Hooks:

.1 one in each individual barrier-free washroom. 2 per cubbie. Refer to Section 06 41 13.

.2 install on wall opposite to grab bar beside toilet, at 1200mm above the floor.

.5 Grab bars:

.1 At each barrier free toilet stall, provide one L-shaped 750mm x 750mm and one 600mm long bar.

.2 In all barrier free washrooms, provide one swing-up grab bars as indicated on drawings.

.3 All grab bars to be mounted in accordance with O.B.C. requirements.

.6 Standard Mirrors:

.1 Install minimum one Type M1 mirror in each washroom, except in barrier free washrooms where tilt mirrors are required.

.2 Install one Type M1 mirror per lavatory station in student washrooms. Install mirrors so that the bottom of the glass is within 1000mm of the finished floor level.

.7 Tilted Mirrors:

.1 one, over one lavatory where barrier free facilities are provided.

.8 Vanity shelf: one below each mirror, and where indicated on drawings.

.9 Sanitary Napkin Disposal Unit (SND):

.1 one in each unisex Washroom

.10 Sanitary Napkin and Tampon Vendor (SNV):

.1 Where barrier-free facilities are provided, install SNV in accordance with OBC requirements for barrier-free use.

.11 Supply and install one custom size toilet backrest at each barrier free toilet.

.12 Provide additional items where number of units indicated on drawings exceed those referenced above.

3.2 **INSTALLATION**

.1 Securely fasten accessories level and plumb in the locations shown on the Drawings and as specified herein. Mounting heights shall be generally as shown on Drawings, confirm with Consultant prior to installation.

.2 Install accessories for barrier-free facilities in accordance with the barrier-free provisions of the Ontario Building Code.

.3 Co-ordinate installation with the work of Trades providing adjacent construction as required to achieve the reveals or other edge conditions shown where front faces of units are flush with the finished wall surfaces.

.4 Perform drilling of ceramic tile, masonry and concrete necessary to install the accessories.

.5 Insulate accessory surfaces to prevent electrolysis due to contact with masonry, concrete or dissimilar metal surfaces. Use bituminous paint, building paper or other approved means.

.6 Clean all accessories in conformance with Section 01 74 00.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Concrete block Section 04 22 00

1.2 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 23.

.2 Submit colour samples for selection of colours for student coat racks.

PART 2 - PRODUCTS

2.1 STUDENT COAT RACKS

.1 Where noted on Drawings as "Coat Racks (CR)", supply and install Architectural School Products Coat And Hat Racks, STL 1001 Student Line model, lengths as noted on plans. Similar units by Vogel Peterson or Global School Products are Acceptable.

.2 Wall track shall be 330mm long, heavy gauge aluminum extrusion, spaced at 1016mm maximum and permitting vertical adjustment of brackets.

.3 Brackets shall be two piece die cast aluminum with integral back plate giving firm anchorage to track.

.4 Shelf shall consist of four 19mm square 18 gauge steel tubes with plastic end caps.

.5 Coat hooks shall be double prong moulded ABS high impact plastic arranged on 2nd and 4th tubes at 120mm O.C. maximum; colours shall be selected by Consultant. Provide 30 double hooks per classroom, including all specialty classrooms.

.6 All metal parts shall be finished with Duracron enamel. Colour will be selected by Consultant from manufacturers standard range.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Deliver to site and install as per manufacturer's instructions and drawing details; complete for final mechanical and electrical connections where applicable.

.2 Coordinate to ensure all required blocking and supports are installed prior to commencing installation of the products specified herein.

.3 Clean all substrates thoroughly before commencing installation.

.4 Student coat hooks on ground floor to be mounted at 1200mm A.F.F. Confirm height with user prior to installation.

.5 Install work square, plumb, straight, true and accurately fitted.

.6 Clean surfaces and clean up work area at completion of installation.

END OF SECTION

PART 1 - GENERAL

1.1 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 23.

PART 2 - PRODUCTS

2.1 STORAGE SHEDS

.1 Supply and install (2x) Brooklin Model 105 storage sheds.

.2 Supply and install (1x) Brooklin Model 40 storage sheds.

.3 Refer to septic drawings for additional storage shed to be provided by Septic Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Deliver to site and install as per manufacturer's instructions and drawing details; complete for final mechanical and electrical connections where applicable.

.2 Coordinate to ensure all required blocking and supports are installed prior to commencing installation of the products specified herein.

.3 Clean all substrates thoroughly before commencing installation.

.4 Install work square, plumb, straight, true and accurately fitted.

.5 Clean surfaces and clean up work area at completion of installation.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES:

.1 Automatic, electrically operated, roll-up projection screen, controls, and accessories.
  .1 Location: General Purpose Room

1.2 RELATED SECTIONS

.1	Metal Fabrications	Section 05 52 00
.2	Electrical	Division 26

1.3 SUBMITTALS

.1 Provide in accordance with Section 01 33 23:

  .1 Product data for projection screens and accessories.

  .2 Shop drawings:
    .1 Indicate dimensions, fabrication and installation details, and electric wiring diagrams.
    .2 Detail means of attachment to structure and indicate all loading.

  .3 Shop drawings shall be selaed by a professional engineer, registered in Province of Ontario, who shall be responsible for the securement of the screen, including seismic constraint.

  .4 Samples:
    .1 Finishes for selection by Consultant.
    .2 Viewing surface: 150 by 150 mm minimum size.

.2 Provide manufacturer's installation, operation, maintenance, and cleaning instructions for inclusion in Maintenance Manuals.

1.4 QUALITY ASSURANCE

.1 Manufacturer qualifications: Firm with 10 years minimum successful experience manufacturing electric projection screens.

.2 Installer Qualifications: Authorized and trained by the manufacturer to install systems required.

.3 Motors for electric screens shall be certified by Underwriters Laboratory (Canada), and shall bear the ULC or cUL label.

.4 Screens installed in return air ceiling plenums shall be certified by Underwriters Laboratory (Canada), and shall bear ULC or cUL label.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver projection screens after building is enclosed and construction in rooms where screens will be installed is substantially complete.

.2 Deliver screens in manufacturer's undamaged, labelled packaging.

.3 Store products in manufacturer's unopened packaging until ready for installation.

.4 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results, before, during, and after installation.

PART 2 - PRODUCTS

2.1 PROJECTION SCREENS

.1 Products shall be as manufactured by Legrand AV Inc., or Draper Inc.

.2 Electric Projection Screens:

.1 Electrically operated, retractable projection screens with rigid metal roller housing motor as manufactured by Legrand AV Inc.

.1	Wall Mounted:	Da-Lite Cosmopolitan
.2	Size:	2950mm H x 2950mm W
.3	Viewing Surface:	Matte White, as specified below.
.4	Viewing Format:	Square format, 1.00 to 1.00.
.5	Masking:	Black masking borders.
.6	Case:	fabricated from 22 gauge steel with steel end caps
.7	Finish:	White, baked enamel paint coating, standard.
.8	Low voltage control:	Single Motor Low Voltage Control (LCV) built-in.

.3 Controls:

.1 Electric screen low voltage control:

.1 Single motor, low voltage control unit with screw terminal blocks for 115 volt power source input and motor output, input terminals for multiple wall switches, and receivers for radio frequency and infrared transmitters.

.2 Housing: 57 by 114 by 178 mm galvanized steel enclosure.

.2 Wall switches:

.1 Provide low voltage control unit with low voltage, 3 position control switch for UP, DOWN, and STOP functions.

.2 Provide switch with box and hinged, key-locked, stainless steel cover plate.

.3 Provide 4 keys to Owner for each screen.

.3 Infrared remote control:

.1 Hand held, 3 button, infrared transmitter with UP, DOWN, and STOP functions.

2.2 VIEWING SURFACE

.1 Matte White as manufactured by Da-Lite Screen Company, Inc.

.1 Flame retardant, mildew resistant, white, vinyl coated fibreglass screen that can be rolled and cleaned with mild soap and water solution.

.2	Gain:	1.0
.3	Viewing angle:	60 degrees
.4	Masking:	Black
.5	Seams:	Seamless where possible; screens over 3050mm may have max 1 seam, flat, horizontal; vertical seams are not permitted.

.2 Permanently attach screen fabric to roller. Provide bottom of screen with metal rod in pocket.

2.3 **ACCESSORIES**

.1 Installation hardware:

.1 Provide attachment hardware, fasteners, and other components of type, size, and spacing recommended by manufacturer for complete, functional, secure installation of electric screens.

.2 Floating mounting brackets: Provide adjustable mounting brackets with white finish to move screen to left or right for proper centering on wall and alignment to projector.

PART 3 - EXECUTION

3.1 **COORDINATION**

.1 Coordinate provision of electric screens with locations of other wall and ceiling mounted components such as, structural framing, light fixtures, air diffusers, ducts, and fire sprinklers to eliminate potential conflicts.

.2 Coordinate requirements for masonry reinforcing, construction of recesses, and auxiliary structural supports to ensure adequate means for installation of screens.

.3 Coordinate requirements for power supply, conduit, and wiring required for electric screen and controls.

.4 Coordinate with forces installing projector mounts.

.5 Prior to installation, verify type and location of power supply.

.6 Do not commence installation of projection screens until substrates have been properly prepare.

3.2 **INSTALLATION**

.1 Install screen in accordance with approved shop drawings and manufacturer's installation instructions.

.2 Provide attachment hardware, fasteners, and other components of type, size, and spacing recommended by manufacturer for complete, functional, secure installation of screens.

.3 Install projection screen at location and height indicated on Drawings. Verify locations in field with Consultant.

.4 Install screen securely to supporting substrate so that screens are level and back of case is plumb.

3.3 TESTING AND PROTECTING

.1 Testing:
- .1 Operate screen three times minimum.
- .2 Ensure screens properly extend and retract and that screen is level and viewing surface plumb when extended.
- .3 Verify controls, limit switches, and other operating components are functional.
- .4 Adjust to correct deficiencies.

.2 Protect projection screens from damage resulting from subsequent construction activities. Remove and replace damaged screens.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Supply and install manually operated, full height room darkening shades at all exterior windows, except where motorized shades are required.

.2 Supply and install motorized blackout shades to Clerestory windows in General Purpose Room.

.3 Supply and install manually operated, full height room darkening shades at all instructional room sidelights as indicated on Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Concrete Unit Masonry	Section 04 22 00
.2	Glazed Curtain Walls	Section 08 44 13
.3	Aluminum Windows	Section 08 51 13
.4	Mechanical	Division 23
.5	Electrical	Division 26

1.3 SUBMITTALS

.1 Submit list of proposed materials.

.2 Submit manufacturer's specifications, product data, and other data needed to prove compliance with the specified requirements.

.3 Shop drawings shall include sufficient detail to show fabrication, installation, anchorage, electrical and control wiring, and interface of the work of this Section with the work of adjacent trades. Indicate field measurements on shop drawings.

.4 Manufacturer's recommended installation procedures which, when approved by the Consultant will become the basis for accepting or rejecting actual installation procedures used on the work.

.5 Fabric to be flame retardant. Provide proof of compliance with CAN/ULC S109, Flame Tests of Flame-Resistant Fabrics and Films, small scale vertical burn requirement test.

.6 Submit fabric samples for colour selection by the Consultant.

.7 Provide printed operation and maintenance instructions for inclusion in maintenance manuals.

1.4 WARRANTY

.1 Provide a warranty for an extended period of **three (3) years** from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 MATERIALS - MANUAL SYSTEM

.1 Manual shades shall be Teleshade system with smooth operating chain and sprocket roller as manufactured by Solarfective Products Ltd., or equivalent by Draper Inc. or Sun Glow Window Covering Products of Canada Ltd.

.2 Provide system with easy lift (chain operated) action with infinite positioning. Left or right hand operation to be determined. Provide chain holders.

.3 Provide fully factory assembled shade unit consisting of two end brackets, shade tube, extruded anodized aluminum fascia, hembar and specified fabric.
- .1 Mounting type: Wall mounted above frame opening, head mounted at exterior windows.
- .2 Provide side and bottom blackout channels.
- .3 Removal must not require the disassembly of the shade units.

.4 End Bracket:
- .1 77x96mm end bracket shall be a two piece moulded ABS construction with a 64mm diameter nylon drive sprocket.
- .2 Bracket colour shall co-ordinate with the fascia colour.

.5 Shade Tube:
- .1 38mm extruded anodized aluminum shade tube shall be 1.52mm thick with three internal continuous fins 4.82mm high, for strength and drive capabilities when attached to the nylon sprocket.
- .2 The fins shall be spaced 120 degree apart.

.6 Fascia: Extruded anodized aluminum fascia shall be 1.7mm thick, squared design, to cover underside of assembly.

.7 Drive Assembly:

.1 Shall be factory set for size and travel of shades.

.2 Capable of being field adjusted from the exterior of the shade unit without having to disassemble the hardware.

.3 Provide with a built-in shock absorber system to prevent chain breakage, under normal usage conditions.

.8 Drive Chain: No. 10 stainless steel bead chain formed in a continuous loop. The chain shall have a 90 lb test strength.

.9 Exterior Hembar: Extruded aluminum, clear anodized, with plastic end finials.

2.2 **MOTORIZED SYSTEM**

.1 Provide electrically operated, roll-up opaque fabric window shades, including motor, controls, mounting hardware, and accessories; as manufactured by Solarfective Products Ltd. or Draper Inc.

.2 Motor: 95-125V-AC, single phase, 60 Hz, instantly reversible, lifetime lubricated, with internal thermal overload protector, electric brake, pre-set accessible limit switches, maintenance free, CSA approved. Motor operator shall be concealed inside the shade tube.

.3 Internal Limit Switches: adjustable by two hex key limit switches to allow exact setting of stop position in both the raise (top) and lower (bottom) positions. Micro switches to provide circuit breaking at the end of the run.

.4 Brake: Solenoid activated disc brake mechanism to stop and hold in any position. Brake to automatically disengage when motor is operating.

.5 Gear Box: 3 levels of satellite gears for load distribution, planetary type gears machined to close tolerance of tempered steel. Speed to be 30 RPM.

.6 Installation: Two screws to lock the drive end wheel of the motor to the tube. A notched section in the tube to turn the ring which activates the shade assembly. Upper and lower stop positions are adjusted with hex key limit switches located on motor end.

.7 Controls:

.1 Window shades shall be operated by key operated wall switches, located remotely as directed by the Consultant. Shade manufacturer shall supply the key switches for each installation and coordinate hook-up by the Electrical Contractor.

.2 Key switches shall be CSA approved, complete with brushed stainless steel cover plates. All shades on the same section of window wall shall be grouped together on a single switch; each grouping will be operated independently. Provide six keys.

.8 Fabloc Tube: Extruded aluminum tube, 6063 - T5 alloy, 64mm O.D. tube with internal keyway to receive tubular motor. Tube shall be extruded with two fabric mounting channels. Channels shall be designed to accept fabloc spline. Provide long span fabloc tubes where required.

.9 Fabloc Spline: Extruded vinyl with asymmetrical locking channels and embossed fabric guide, for use with 64mm O.D. tube. Spline shall be snapped and locked into fabloc tube and have sufficient capacity to support fabric shade. Spline shall be readily removable without dismounting fabloc tube from end brackets.

.10 End Brackets (Drive and Idler): Shall consist of 3mm thick sheet steel. Wall, jamb, or ceiling mounted as required. Shall be permanently installed and accept fascias.

.11 Fabloc Tube End Plug: Derlin end cap shall have steel pin which permits up to 9mm lateral adjustment in tube width.

.12 Fascia: Provide extruded 6063-T5 aluminum fascia with anodized finish. Fascia shall hang on to extruded aluminum mounting clips and brackets without any exposed fastening devices. Fascia shall be square type to enclose the entire assembly.

.13 Hembar: Extruded aluminum, clear anodized, with plastic end finials

2.3 **SHADING FABRIC**

.1 Standard Fabric:
- .1 Solarfective Sun Control 4800 Series, 1% open
- .2 Fabric shall be woven vinyl coated polyester.

.2 Blackout Material:
- .1 Phifer ShearWeave Style 7000 Black-out Fabric.
- .2 100% polyester with acrylic backing

.3 Fabric shall hang flat, without buckling or distortion. Edge, when trimmed, shall hang straight, without ravelling. An unguided shade cloth shall roll true and straight, without shifting sideways more than 3mm in either direction due to warp distortion or weave design.

.4 Fabric shall be dimensionally stable, and flame retardant, in accordance with CAN/ULC S-109 small scale vertical burn test.

.5 Colours for window shades will be selected by the Consultant from the manufacturer's standard collection. A minimum of 8 colour choices must be offered.

PART 3 - EXECUTION

3.1 **EXISTING CONDITIONS**

.1 Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 **INSTALLATION**

.1 Co-ordinate as required with other trades to assure proper and adequate provision in the work of those trades interfaced with the work of this Section. Ensure that Electrical Contractor is supplied with control and switch components and instructions for installation prior to construction walls.

.2 Fasten support brackets to masonry and/or steel lintels. Fastening brackets to aluminum window or curtain wall frames will not be accepted.

.3 Install the work of this section in strict accordance with approved Shop Drawings, pertinent requirements of government agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Consultant anchoring all components firmly into position for long life under School environment use.

.4 Install the work plumb, level, and in proper operating condition.

.5 Upon completion of the installation, put each operating component through at least five complete cycles, adjusting as required to achieve optimum operation and complete blackout at all edges.

.6 Electrical Contractor shall provide and install all conduit & wiring required and shall install controls and wire motors and switches.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Grading	Section 31 22 00
.2	Excavation and Fill	Section 31 23 00
.3	Topsoil	Section 32 91 00

1.2 SITE CONDITIONS

.1 Establish the location of all utilities and buried objects prior to commencement of any work. Known underground and surface utility lines and buried objects are indicated on the drawings. Carefully excavate around buried lines and objects.

.2 It is assumed that all soils adjacent to and below asphalt and concrete paving will be contaminated with de-icing salts. Include for disposal at facilities accepting salt contaminated materials.

.3 Refer to geotechnical reports and soil chemical analysis for further information on the condition of existing soils.

.4 Assume that excavated material is contaminated with construction material and is not reusable. Dispose of excavated material in accordance with Ontario regulation O. Reg. 406/19.

1.3 PROTECTION

.1 Prevent damage to existing roads, sidewalks , trees, landscaping, natural features, bench marks, and surface or under-ground utility lines which are to remain. Repair any damage.

PART 2 - MATERIALS

2.1 MATERIALS

.1 N/A

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

.1 Clear construction area of all vegetation, sod, debris, gravel, and any piles of deleterious fill, prior to excavation. Remove tree stumps so that they do not constitute an obstruction to services and underground work or cause later settlement of paved areas.

.2 Dig out and remove all roots, boulders, loose rocks or other obstructions encountered. If any large rocks are excavated they may be left on site provided they are located as directed by the Consultant.

.3 All trees and plants to be retained must be properly protected, to municipal standards.

.4 All existing fill below the building and paved areas must be removed to the level of undisturbed subsoil prior to the placement of new fill, engineered fill, or the commencement of building foundation work, to the approval of the geotechnical testing and inspection company. Refer to Section 31 23 00, Excavation and Fill.

3.2 **SURPLUS MATERIAL**

.1 Remove surplus materials from site. On site material can be used as fill only at landscaped areas, and only subject to approval by the geotechnical inspection and testing company.

.2 Remove materials unsuitable for fill, grading or landscaping from site.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Insulation at foundations and below slab-on-grade	Section 07 21 13
.2	Site Clearing	Section 31 10 00
.3	Excavation and Fill	Section 31 23 00
.4	Topsoil	Section 32 91 00

1.2 SITE CONDITIONS

.1 Known underground and surface utility lines and buried objects are indicated on drawings. Establish the location of all utilities and buried objects prior to commencement of any work. Carefully excavate around buried lines and objects.

.2 Contractor will be responsible for providing adequate site access and storage areas.

.3 Contractors to review geotechnical reports and determine what measures will be required for the anticipated site conditions.

.4 It is assumed that all soils adjacent to and below asphalt and concrete paving will be contaminated with de-icing salts. Include for disposal at facilities accepting salt contaminated materials.

.5 All existing fill below the addition and paved areas must be removed to the level of undisturbed subsoil, to the approval of the geotechnical testing and inspection company, prior to the placing any new fill, engineered fill, or commencement of building foundation work. Existing soils are not suitable for re-use as backfill material and excavated materials are to be removed from site or sued in landscape areas.

.6 Conform with Excess Soils Management Requirements and O. Reg. 406/19.

1.3 QUALITY CONTROL

.1 Testing and inspection by the Geotechnical Testing and Inspection Company is required. Refer to the Field Quality Control specifications included in Section 31 23 00, Excavation and Fill.

.2 Costs of testing and inspection will be paid from the Cash Allowance included in the Contract. Refer to Section 01 10 00.

.3 These specifications include the requirement for the provision of a topographical survey after the completion of finish grading as specified under the Finish Grading subsection, below. The cost of this survey is to be included in the Contract.

1.4 PROTECTION

.1 Prevent damage to existing natural features, bench marks, surface or under-ground utility lines which are to remain. Make good any damage.

PART 2 - MATERIALS

2.1 MATERIALS

.1 Obtain Consultants approval of all material used as fill for grading work. Protect approved material from contamination.

.2 All backfilling and granular materials must conform to Section 31 23 00. Fill types referenced below are listed in that Section.

.3 Fill at landscaped/sodded areas:
- .1 Fill shall be clean imported fill, free from contaminants, and approved by Inspection Company (Fill Type F6).
- .2 A limited amount of on site materials may be available for reuse (Fill Type F4) subject to approval of the testing and inspection company.

.4 Fill at paved areas:
- .1 Fill shall be Fill Type F2, clean, granular imported fill, suitable for compaction to 98% Standard Proctor modified dry density and approved by Inspection Company.

.5 Fill below addition:
- .1 All fill required below building area shall be engineered fill, in accordance with Section 31 23 00, Excavation and Fill.
- .2 Material for engineered fill shall be Type F2, clean, granular imported fill, suitable for compaction to 100% Standard Proctor modified dry density and approved by Inspection Company.

PART 3 - EXECUTION

3.1 GRADING

.1 Rough grade to depths required for surface finishes indicated.
- .1 Note that where engineer fill is to be placed below building area, it must be to a minimum thickness of 600mm below footings and 600mm below stone base at slab-on-grade.

.2 Prior to placing fill over existing ground at landscaped areas, scarify surface to depth of 150mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.3 Prior to placing fill over existing ground at building and paved areas remove any wet and/or soft spots and re-compact the surface to minimum 98% Standard Proctor Maximum Dry Density.

.4 Slope rough grade away from the building at minimum slope of 2% min.

.5 Grade swales to depth required for maximum run-off as indicated.

.6 At building areas, subgrade shall be inspected and approved by the geotechnical testing and inspection company prior to the placement of any fill. Fill below footings and slab-on-grade shall be engineered fill, placed and compacted as specified in Section 31 23 00 under full time supervision of the geotechnical testing and inspection company.

.7 At pavement areas, lay and compact additional fill Type F2 to at least 98% of its Standard Proctor maximum dry density, prior to placement of the granular sub-base course. Remove soft or saturated areas encountered, replace with approved imported fill, and compact as above.

.8 At sodded and landscaped areas, bring grades up to levels required for placement of topsoil with imported fill. Lay and compact fill generally to 95% Standard Proctor maximum dry density to ASTM D698.

3.2 **FINISH GRADING**

.1 Import and place topsoil to depths indicated at sodded, seeded and landscaped areas. Fine grade and loosen topsoil. Eliminate rough spots and low areas to ensure positive drainage.

.2 Roll to consolidate topsoil for areas to be sodded, leaving surface smooth, uniform, firm against deep foot printing. Refer to Section 32 91 00 for topsoil.

.3 After completion of finish grading, and before commencement of sodding and landscaping, submit a topographical survey, prepared by an Ontario Land Surveyor, indicating finished grades. Grades must be accepted by the Consultant before work proceeds. Refer to Section 32 91 00.

3.3 **SURPLUS MATERIAL**

.1 Remove surplus material from site in accordance with O. Reg. 406/19.

.2 On site material, approved by Consultant, can be used as fill only at landscaped areas.

.3 Remove material unsuitable for fill, grading or landscaping from site.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Cast-In-Place Concrete	Section 03 30 00
.2	Vapour Barrier under slab-on-grade	Section 03 30 00
.3	Site Clearing	Section 31 10 00
.4	Grading	Section 31 22 00
.5	Asphalt Paving	Section 32 12 16
.6	Concrete Paving and Curbs	Section 32 13 13
.7	Topsoil	Section 32 91 00
.8	Sodding	Section 32 92 23
.9	Exterior Plants	Section 32 93 00
.10	Sub-drainage	Section 33 46 00

1.2 PROTECTION

.1 Protect existing buildings, fencing, service poles, wires, underground services and paving located on this and adjoining properties from damage. Make good damage resulting thereto to the approval of the Consultant and at no cost to the Owner. Make good any damage due to inadequate bracing, or improper compaction of backfill at no cost to the Owner. Maintain carefully all bench marks, and other reference points. If disturbed or missing, replace as directed by a Registered Ontario Land Surveyor at no cost to the Owner.

.2 Provide protection and heating as necessary where the bearing surface is in danger of freezing before concrete is poured.

.3 Do not load vehicles employed in the cartage of materials beyond rated limits, nor in such a manner as to cause spillage. Promptly remove spillage and tire tracking on public property. Alert drivers to the right of way of pedestrians and other vehicular traffic at exit from the site.

1.3 FIELD QUALITY CONTROL

.1 Employ the inspection and testing company appointed by the Consultant to test proposed fill material and to inspect, test and approve compaction of fill.

.2 Testing company shall provide continuous supervision during preparation, placing, and compacting of Engineered Fill.

.3 The Inspection and Testing company shall carry out the following:

.1 Determine at what depth the existing soil is capable of supporting the structure and engineered fill.

.2 Inspect the subgrade prior to proof rolling to ensure that it is sufficiently dry and stable to carry out the proof rolling operation.

.3 Inspect the source of the proposed granular material to determine the potential for the pit for quality consistency of the product.

.4 Carry out grain-size analysis on sample of each type of granular fill to ensure that proper material is being placed.

.5 Provide continuous supervision of engineered fill operation, controlling the moisture content for even compaction and maximum density for every lift.

.6 Conduct constant compaction testing, using a nuclear moisture-density gauge, throughout the placement of all backfill material.

.4 Co-operate with the inspection company and give adequate notification of any changes in sources of supply, additional work shifts and any other proposed changes.

.5 The cost of such inspection and testing shall be paid for under Section 01 10 00. The cost of retesting unacceptable compaction shall be borne by the Contractor.

.6 Any recommendation made on site by the Inspection & Testing Company which will result in extra cost must be approved by the Consultant BEFORE the work proceeds or claims for additional payment will not be accepted.

.7 The Contractor shall be responsible for determining the quantity of fill that is likely to be usable on site, for landscaped areas only, based on information provided in geotechnical reports. Contractor must assume responsibility for drying of fill as required to achieve compaction results specified. All on-site materials must be approved for use by the Inspection Company, and are subject to the same testing requirements and standards as imported materials. Remove all materials which are deemed unsuitable for re-use. Note that all fill materials below building and paving areas must be imported materials.

.8 A copy of the Geotechnical report is supplied with the Bidding Documents. It is intended for information only. *The recommendations in the Geotechnical report are to be considered minimum requirements*. The requirements in the Contract Documents may exceed those of the Geotechnical report.

1.4 **CONTAMINATED FILL**

.1 It is assumed that all soils adjacent to and below all asphalt and concrete paving will be contaminated with de-icing salts. Include for disposal at facilities accepting salt contaminated materials.

.2 Where reports indicate other areas of contaminated fill, arrange for disposal at specialized facilities accepting such contaminated fills.

.3 No extras will be permitted for disposal of contaminated fills, where such requirements should be reasonably predictable by examination of the site and/or the available reports.

1.5 **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 or factors.

PART 2 PRODUCTS

2.1 MATERIALS

.1 All fill materials to be imported, from approved sources, with the exception of approved site materials classified as Fill Type F4, below.

.2 Fill material: approved materials free from organic matter, rubbish and other deleterious materials and complying with the following requirements:

.1 Fill Type F1: imported, clean, clear crushed stone, 19mm size, imported from approved source

.2 Fill Type F2: imported, clean, natural river sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter graded within the limits of OPSS.MUNI 1010 granular Class 'B' Type 1 material

.3 Fill Type F3: concrete backfill 15 MPa strength at 28 days complying with the requirements of Section 03 30 00

.4 Fill Type F4: approved granular, free draining material excavated from the Site, free from rubbish, organic and vegetable matter, topsoil and large clay lumps and boulders

.5 Fill Type F5: imported, non-frost susceptible sand

.6 Fill Type F6: imported, clean, free draining fill suitable for landscape areas

.3 All granular materials must be approved by the Inspection and Testing Company.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Carefully examine Site including access to the Site. Site is required to be cleared and rough graded, as specified, prior to commencing excavation and fill work.

.2 Establish the extent and nature of the materials, which may be necessary to remove and the amount of fill to provide the required grades.

.3 Check dimensions at the Site before commencing excavation work and report discrepancies to the Consultant.

.4 Consult utilities to ascertain location of services. Promptly notify the Consultant if uncharted services or drainage lines are uncovered during excavation. Cap services to the approval of the utilities affected.

.5 Provide suitably located bench marks for elevation control and selected grid line references. Provide detailed line and grade staking for elements of the earth work.

3.2 EXCAVATION

.1 Do all excavation required for the Work excluding mechanical and electrical trades. Excavate beyond property lines to extent noted on Drawings for this Contract.

.2 Excavate for footings to native undisturbed soil with an allowable bearing capacity of 100kPa at SLS and factored bearing capacity of 125kPa at ULS. Refer to Structural Drawings for detailed Design of footings.

.3 Excavate to depth required for footings, and for slab on grade and underbed. Base of footings and foundation shall be not less than 1400mm below finished grade.

.4 Excavations carried too low shall be filled with 15 MPa min. concrete at no additional expense to the Owner. Obtain prior approval for lowering footings.

.5 Trim bottom of excavations and obtain approval of the Consultant and authorities having jurisdiction before placing concrete or granular material.

.6 Protect ground and/or bottom of excavation to prevent freezing using suitable insulation materials. If ground is frozen at foundation level when concrete is about to be placed, defrost or excavate to lower depth where ground is not frozen, and extend new construction down to new approved foundation level at no extra cost to Owner. *DO NOT PLACE CONCRETE ON FROZEN GROUND*. Frozen ground shall not delay progress of work.

.7 Should soil at depth shown prove to be unsatisfactory to the Consultant for placing of structural work thereon, upon the Consultant's written order, excavate to greater depth until a satisfactory bottom is reached. All work to be verified by Inspection and Testing Co.

.8 At slab-on-grade and paved areas, surface compact existing soil to 98% SPMDD. Bring grade up to underside of granular base or sub-base as specified below for backfilling.

.9 Where interlocking stone pavers are to be placed, provide a minimum depth of 300mm Type F5 fill.

.10 The Consultant must be notified when excavations for foundations are ready for inspection and their approval shall be obtained before footings or foundations are placed.

3.3 DEWATERING

.1 Groundwater seepage into excavations is expected and the Contractor shall allow for dewatering.

.2 Keep excavations free from water until concrete is poured. Pump out and remove any free water and do not allow water to accumulate in the excavations.

.3 If excavations are done in Spring, when groundwater levels are seasonably higher, provide dewatering system including well points and perimeter ditching.

.4 Keep excavations free from water until concrete is poured. Pump out and remove any free water and do not allow water to accumulate in the excavations.

.5 If it should prove necessary during the progress of the work to interrupt or obstruct flow of artificial drains, provide for this in such a way that no damage shall result to the property of the Owner or the adjoining property.

.6 Pumping of water containing silt in suspension into waterways, sewer or drainage systems is prohibited.

.7 Dispose of water containing silt in suspension in accordance with local authority requirements. Silt fencing is required to contain silt on site.

.8 Take full responsibility for maintenance of existing drainage, above ground and underground, adjacent to the Work or affected by the Work.

.9 Before commencing any Work likely to affect the drainage of water from the Site, provide necessary alternative drainage systems to ensure that water will be conducted to alternative outlets. Do not block or impede any drain until such safety precautions have been made.

3.4 **BACKFILLING**

.1 Do not backfill over frozen ground. Do not place backfill until the sub-grade, footings, foundation walls and drainage tile have been inspected and approved. Do not backfill at ambient temperatures below 0°C. without approval. Do not use frozen materials as backfill. Temporary backfilling not permitted. Be responsible for damage to buried services, due to backfilling.

.2 Place fill material against both sides of walls. If it is not practical to carry out backfilling in this manner, brace the walls adequately to prevent damage to the walls.

.3 Where walls are to be backfilled on one side only, commence backfilling only when the structural members are in place or adequate bracing is provided for top and bottom of foundation walls.

.4 Backfill service line trenches to depth required, with backfill material as specified below. All fill under floor slabs and paving must be imported materials. Backfilling of trenches in landscaped areas shall be with fill Type F4, suitable on-site materials; refer to Section 33 10 00.

.5 Fill locations:

.1 Use Type F1 fill under interior concrete slabs-on-grade to a minimum compacted depth of 250mm.

.2 Use Type F1 fill under all exterior concrete slabs on grade and sidewalks to a minimum compacted depth of 200mm.

.3 Use Type F2 fill at concrete slabs-on-grade, at interior walls, in trenches and pits below slabs and paving, and for fill for over-excavated areas to underside of Type F1 fill.

.4 Use Type F2 fill for engineered fill; refer to engineered fill specifications below.

.5 Use Type F2 fill below Type F1 base at concrete and below sub-base at asphalt paving where required to bring grade above existing levels. Refer to Section 32 12 16 for base and sub-base below asphalt paving.

.6 Use Type F3 fill under foundations where indicated on drawings, and where required to bring over-excavated areas up to the required level, subject to approval by the geotechnical testing and inspection company on site.

.7 Type F4 fill may be used under landscaped areas only, below topsoil, and then only subject to approval by the testing and inspection company.

.8 Use Type F6 fill , or approved Type F4 fill, under topsoil areas.

.6 Properly roll, tamp or otherwise consolidate in place each layer of backfill. Maintain fill within 2% of its optimum moisture content. If fill is too dry, dampen it with water to obtain the water content required. If the fill is too wet, aerate it.

.7 Spread fill in layers not exceeding 150mm uncompacted depth. Carry out fill operations systematically. Prevent segregation of particle sizes. Compact as detailed below.

.8 After backfilling and compaction is completed, scarify surface to a uniform depth sufficient to eliminate depressions and irregularities.

3.5 **ENGINEERED FILL**

.1 Engineered fill is required below both exterior and interior footings where the footings are located higher than competent, undisturbed subsoil.

.2 Engineered fill is required below slab-on-grade, to underside of stone base.

.3 Where footings and slabs-on-grade are to be placed on engineered fill, the required bearing pressure is 100kPa at SLS (125 kPa at ULS).

.4 After preparation of site, the base of the area to receive engineered fill must be inspected by the Geotechnical Testing and Inspection Company; do not proceed until subgrade is approved.

.5 Engineered fill below footings and slabs shall extend from approved compacted subgrade, but must not be less than 600mm compacted depth, and shall extend minimum 1.0m horizontally beyond outside edge of foundations, sloping downward at a 1:1 slope to the competent native soil.

.6 Engineered fill to consist of a uniform mat of not less than 600mm compacted depth of imported granular materials, Type F2, as specified above. Existing on-site materials may not be used as fill within the building area.

.7 Place well graded fill Type F2 up to underside of footings and clear stone base. Lifts shall not exceed 200mm loose depth. Compact to 100% of SPMDD.

.8 Do not place engineered fill under wet conditions without the expressed permission of the Testing and Inspection Company, who shall review the conditions and the fill materials to be used and recommend a course of action.

.9 Do not place fill in freezing temperatures. Any fill which has frozen is to be removed prior to placing subsequent lifts.

.10 Full time supervision by the Geotechnical Testing and Inspection Company is required during the placing and compacting of engineered fill.

3.6 WORKING SURFACE

.1 Contractor shall include the placement of a crushed stone working surface. Working surface is required completely around the building and shall extend for 3 metres beyond the face of the building. Provision of the working surface within the building area is recommended, but will be left to the discretion of the Contractor.

.2 Working surface shall consist of Fill Type F1, placed to a minimum compacted depth of 400mm.

.3 The grade level at which the working surface is placed will be the decision of the Contractor. Raising of grades to final levels indicated on drawings shall be as specified.

3.7 COMPACTION

.1 Compact until the required density is achieved. Do not compact any material containing frost.

.2 Fill hollows and depressions which develop under compaction with matching backfill material. If the base becomes rutted or displaced due to any cause, regrade the surface.

.3 Compaction Method:
- .1 Compact backfill by means of vibrator type equipment capable of achieving the desired degree of compaction.
- .2 Use manually operated vibratory tampers in the proximity of foundations and retaining walls, and in areas not readily accessible to roller equipment.
- .3 Make good damage to the structure due to compaction and settlement of fill.
- .4 Report damage to foundation promptly to the Consultant. Obtain approval of remedial procedures.

.4 Compact Type F1 fill to refusal using 8 ton (7.26 tonnes) rollers or equivalent vibrators to 98% Standard Proctor Maximum Dry Density.

.5 Compact Type F2 fill generally to 98% Standard Proctor Maximum Dry Density.

.6 Compact engineered fill to 100% Standard Proctor Maximum Dry Density.

.7 Compact Type F2 fill to 98% Standard Proctor Maximum Dry Density where required to raise grade below concrete slabs and paving, and asphalt paving. This includes area of future asphalt paving at top of retaining wall.

.8 Compact Type F3 fill as Specified on Structural drawings.

.9 Where Type F4 fill is used below landscaped areas, compact to 95% Standard Proctor Maximum Dry Density.

.10 Compact Type F5 fill to 95% Standard Proctor Maximum Dry Density.

.11 Backfill in trenches below building and asphalt and concrete paving shall be compacted to minimum 98% Standard Proctor Maximum Dry Density, and as required for backfill below those areas. Backfill of trenches in other areas must be compacted to 98% SPMDD for at least the top 1000mm; and to minimum 95% SPMDD below that level. Refer also to Section 33 10 00, Site Services.

.12 Make good any damage caused by uncompacted backfill at no cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Division One, General Requirements is part of this Section and shall apply as if repeated here.

1.2 TREE PROTECTION

.1 No construction activity including grade changes, surface treatments or excavations of any kind is permitted around existing trees unless noted to be removed. No root cutting is permitted. No storage of materials or fill is permitted. No movement or storage of vehicles or equipment is permitted. Existing trees must remain undisturbed at all times.

PART 2 - PRODUCTS

2.1 TREE PROTECTION BARRIERS

.1 Tree protection barriers to be 1.2 m (4ft.) high and consist of orange plastic web snow fencing on a 2400mm metal T-bar frame. All supports and bracing used to secure the barrier should be located outside the TPZ. All supports and bracing should minimize damage to roots outside the TPZ. Where some fill or excavate has to be temporarily located near a tree protection barrier, plywood must be used to ensure no material enters the TPZ.

PART 3 - EXECUTION

.1 ABORICULTURAL WORK

.1 Where any roots or branches which extend beyond the tree protection barriers must be performed by a Qualified Arborist or other tree professional. All work performed on tree roots and branches must be in accordance with good arboricultural standards.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Site Clearing	Section 31 10 00
.2	Rough Grading	Section 31 22 00
.3	Concrete Paving and Curbs	Section 32 13 13
.4	Pavement Markings	Section 32 17 23
.5	Site Services	Section 33 10 00
.6	Sub-drainage	Section 33 46 00

1.2 REFERENCES

.1 Ontario Provincial Standard Specifications:

.1	OPSS 310	Construction Specification for Hot Mix Asphalt
.2	OPSS1150	Material Specification for Hot Mix Asphalt
.3	OPSS.MUNI 1003	Material Specification for Aggregates - Hot Mix Asphalt
.4	OPSS.MUNI 1004	Material Specification for Aggregates - Miscellaneous
.5	OPSS.MUNI 1010	Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

1.3 QUALITY ASSURANCE

.1 Qualifications: Paving Subcontractor must have minimum 5 year history of successful work of this type and scope. If requested by Consultant or Owner, furnish references.

.2 Review recommendations and comments in the geotechnical reports. The recommendations therein are to be considered minimum requirements. The requirements of this contract, as per these specifications, may exceed the recommendations of the geotechnical reports.

.3 All granular materials shall be imported materials, from approved sources. On site materials may not be used as fill, sub-base or base materials under asphalt paving.

1.4 INSPECTION AND TESTING

.1 Employ the Inspection and Testing Company appointed by the Consultant to do testing and inspection as outlined below. Payment shall be through the Cash Allowance included in the Contract.

.2 Paving Inspection and Testing shall consist of the following:

.1 Laboratory testing of aggregates, asphaltic cements, and asphaltic concrete, to confirm compliance to specifications.

.2 Laboratory Mix Design evaluation to confirm that the precise proportions of asphaltic concrete components meet the specified properties for the asphalt mix.

.3 Verification of compaction of subgrade.

.4 Quality control during placement, including field sampling and lab testing, and monitoring of asphalt temperature.

.5 Field monitoring and verification of depth and compaction of sub-base, base, and asphalt layers.

1.5 **SUBMITTALS**

.1 Provide samples of all aggregates and other materials proposed for use in asphaltic concrete to Inspection and Testing Company. Fully identify samples as to nature of material, source, job number and name of Subcontractor. Submit a grading analysis with each sample.

.2 Concurrently with the above, submit a copy of each grading analysis to the Consultant, along with a copy of the transmittal listing the samples sent to the Inspection and Testing Company.

.3 Approved samples and their grading analysis shall constitute a standard of aggregate for asphaltic concrete surface course.

1.6 **WARRANTY**

.1 Provide a **two (2) year** written warranty for the work of this section. Warrant work against settlement, failure, frost boil and other deterioration or damage.

.2 Promptly upon notification by Owner, repair or make good without delay any such settlement, failure, deterioration or damage.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Upon request, provide satisfactory proof of quality of material brought to the job site.

.2 All granular materials shall have an in-situ moisture content within 2% of their optimum moisture content.

.3 Aggregates must conform to OPSS.MUNI 1010, Material Specification for Aggregates - Base, Subbase, Select Subgrade and Material Backfill, and shall be as follows:

.1	Sub-base:	OPSS 50mm Crusher-Run Limestone
.2	Base	OPSS 20mm Crusher-Run Limestone

.4 Asphaltic concrete shall conform to OPSS1150, Material Specification for Hot Mix Asphalt, and shall be as follows:

.1	Binder Course:	OPSS HL8
.2	Surface Course:	OPSS HL3. Submit gradation limits of proposed aggregate to Consultant for approval.
.5	Tack Coat:	Emulsified asphalt type SS-1, to OPSS 1103

PART 3 - EXECUTION

3.1 **INSPECTION**

.1 Review geotechnical report and inspect rough grading before commencing work and report any discrepancies to Consultant.

3.2 **INSTALLATION**

.1 General

.1 Make minimum fall to drainage on finished paving 2%.

.2 Fine grade and compact existing undisturbed bed soil and compacted fill to proper grade and contour on areas to be paved and 900mm beyond, before placing sub-base and base courses. Refer to Section 31 22 00 - Grading.

.3 Supply and install calcium chloride as required.

.4 Make surface course free from depressions exceeding 6mm as measured with a 3000mm straight edge paralleling centre line of driveway.

.5 Immediately prior to placing of sub-base materials, proof roll exposed subgrade with heavy rubber-tired vehicle. Sub-excavate any soft, loose, or unstable areas and fill with Fill Type

.6 All asphalt shall be heavy duty.

.2 Composition: Compacted thicknesses of materials and order of application for types of paving required shall comply with the following table.

.1 Asphalt paving, general:

Course	Heavy Duty mm
Sub-base	400
Base	200
Binder	90
Surface	40

.3 Joints:

.1 Make joints between old asphalt or concrete and new asphalt or between successive day's work straight and watertight with positive bond. Cut back to expose fresh vertical surface, free of broken or loose material.

.2 Cut back rolls or depressions in existing edges and bring back to grade with new material.

.3 Before placing hot asphalt, paint joints with thin uniform coating of emulsified asphalt.

.4 Make keyed or butt joints. Feathering not permitted.

.4 Asphaltic Paving:

.1 Place granular fill materials in uniform lifts not exceeding 200mm loose thickness.

.2 Place sub-base granular course to thickness noted and compact to 100% Standard Proctor Density.

.3 Install base course and compact to 100% Standard Proctor maximum dry density.

.4 Place asphaltic courses at temperatures recommended by OPSS documents. Place spread, and compact asphaltic courses in accordance with OPSS 310, and as specified herein.

.5 Compact asphaltic concrete courses to at least 97% Marshall density.

.6 Compact each asphalt course as soon as it can bear roller without undue displacement or hair cracking. Use power driven roller weighing a minimum of 9 tonnes and exerting a pressure on the roller of at least 4.5 kg/mm roll width.

.7 Continue rolling until all roller marks are eliminated. The speed of the roller shall at all times be slow enough to avoid displacement of the mixture. Keep roller wheels slightly moistened by water to prevent adhesion of the mixture but an excess of water will not be permitted. Compact the mixture with hot tampers in locations that are not easily accessible to the machine roller.

.8 Upon completion of compaction each pavement course shall be - smooth and true to crown and grade with variation not more than 6mm from the thickness specified. Do not place any asphaltic course less than 40mm thick nor more than 75mm thick.

.5 Replacement:

.1 To replace unacceptable paving, remove existing asphaltic concrete, base and sub-base, and re-apply materials as specified.

3.3 **EXISTING ASPHALT**

.1 It is assumed that existing asphalt, base and sub-base have been compromised due to age or will be compromised as a result of construction.

.2 Bidders shall provide pricing based on full replacement of asphalt, base and sub-base to depths indicated for new heavy duty asphalt identified above.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Concrete paving and curbs, including vehicular concrete paving, sidewalks, ramps, storage unit bases, all as indicated on drawings

1.2 RELATED WORK

.1	Concrete Formwork	Section 03 10 00
.2	Concrete Reinforcement	Section 03 20 00
.3	Cast-in-place concrete	Section 03 30 00
.4	Pavement Markings	Section 32 17 23
.5	Grading	Section 31 22 00
.6	Excavation and Fill	Section 31 23 00

1.3 REFERENCES

.1 ASTM International:

.1	ASTM A185/ A185M	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
.2	ASTM C295	Standard Guide for Petrographic Examination of Aggregates for Concrete.
.3	ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
.4	ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
.5	ASTM D3963/D3963M	Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.

.2 Canadian Standards Association (CSA):

.1	CAN/CSA A5	Portland Cement
.2	CSA A23.1	Concrete Materials and Methods of Concrete Construction
.3	CSA A23.2	Methods of Test for Concrete.
.4	CAN3 A266.1	Air-Entraining Admixtures for Concrete.
.5	CSA G30.18	Carbon Steel Bars for Concrete Reinforcement
.6	CSA A283	Qualification code for Concrete Testing Laboratories

.3 Ontario Provincial Standard Specifications (OPSS):

.1	OPSS.MUNI 1010	Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
.2	OPSS 1315	Material Specification for White Pigmented Curing Compounds for Concrete
.3	OPSS.MUNI 1350	Material Specification for Concrete - Materials and Production

.4 Conform to the barrier-free access provisions of the Ontario Building Code and the Design of Public Spaces Standards of O.Reg. 191/11 under the Access for Ontarians with Disabilities Act.

1.4 **QUALIFICATIONS**

.1 Concrete supplier to be a member of the Ready-Mixed Concrete Association of Ontario.

.2 Cement finisher to have at least five (5) years of specialized experience.

1.5 **SUBMITTALS**

.1 Submit shop drawing showing layout of tactile warning indicators, particularly where different sizes are required.

.2 Submit shop drawing showing precast concrete parking curb.

.3 Provide product data sheets and installation instructions. Provide colour charts for colour selection by the Consultant.

.4 Samples:
.1 Submit triplicate colour samples for approval by Consultant and Landscape Architect.

.5 Sample panel:
.1 Install sample concrete panels on site for approval.
.2 All subsequent coloured concrete to match sample panels.

1.6 **TESTING**

.1 Contractor will be responsible for the coordination and payment for all required testing services.

.2 During the construction process, compaction testing on the subgrade and granular base will be carried out by an approved testing firm. Any delays caused by failing tests and subsequent remediation work will be the responsibility of the contractor.

.3 Inspection and testing of concrete and concrete materials will be carried out in accordance with CSA A23.1 by a Testing Agency designated by the Consultant. Testing agency shall be certified under CSA A283 with category to suit testing provided.

1.7 **SAMPLE INSTALLATION**

.1 Construct a 1000 x 1000mm sample flatwork panel sample for each specified texture of concrete. Advise Consultant when samples are ready for review; provide minimum 3 days notice for review.

PART 2 - MATERIALS

2.1 MATERIALS

.1 Precast Concrete Parking Bumper Curb:
- .1 2438mm x 150mm x 280mm c/w 5/8" x 14" curb pins. Basis of design is Brooklin Concrete products.

.2 Concrete mixes and materials:
- .1 to Section 03 30 00 - Cast-in-Place Concrete.
- .2 Concrete for all concrete paving and curbs shall be 32 MPa, Class C-2.
- .3 Do not use fly-ash or slag in concrete mix design for coloured concrete, as these will adversely affect the colour.

.3 Granular Materials:
- .1 Granular base: OPSS.MUNI 1010 Granular A
- .2 Granular sub-base: OPSS.MUNI 1010 Granular B, Type II

.4 Clear Curing Compound: W.R. Meadows 1300 clear water-base wax base curing compound.

.5 Form release agent: Non-staining mineral type, chemically active release agents containing compounds that react with free lime to provide water soluble soap. W.R. Meadows "Duogard 11" water - based form release agent.

.6 Form lumber: 38mm x 184mm (2 x 8), free of warp.

.7 Epoxy-coated Reinforcement:
- .1 #10M epoxy coated continuous bars, placed as indicated on drawings.
- .2 Epoxy coated reinforcement shall conform to specifications of section 03 20 00.

.8 Welded Wire Mesh: grade 400 conforming to CSA G30.5, unless indicated otherwise. Mesh shall be supplied in flat sheets only.

.9 Premoulded expansion joint filler: W.R. Meadows "Fibre Expansion Joint" asphalt saturated expansion-contraction joint filler, 10mm thick x depth of slab.

.10 Joint Sealant: cold applied rubber-asphalt sealer. W.R. Meadows #158 cold applied sealer.

.11 Tactile Attention Indicator Tile:
- .1 AODA and OBC compliant indicators, with raised profiles and high colour contrast to adjacent surfaces. Conforming to ISO 23599, "Assistive Products for Blind and Vision-Impaired Persons - Tactile Walking Surface Indicators".
- .2 Cast iron, cast-in-place, detectable/tactile warning surface tile, 610 x 610mm; Wet Set Cast Iron Tiles by TufTile Inc., Advantage Cast Iron Plates as manufactured by Advantage Tactile Systems Inc., or Detectable Warning Plates by Neenah Foundry Products; [in colour to be selected by the Consultant.

.3 Provide additional tile sizes, in manufacture's standard sizes, as may be required for a specific installation; all tiles in a location shall be of the same size unless otherwise accepted by the Consultant.

.4 Conform to BBF POSD 310.039.

PART 3 - EXECUTION

3.1 GENERAL

.1 Conform to the specifications of Division 03, Concrete, for the work of this Section, and the additional requirements herein. In the event of a perceived inconsistency, the more stringent requirements shall be applied.

.2 Coordinate with forces installing equipment over concrete slabs. Receive and cast in anchors and accessories where such items are indicated on drawings.

3.2 LINES AND LEVELS

.1 Employ a competent surveyor to establish and maintain all required lines and levels. Report field dimensions which do not agree with drawing dimensions to the Consultant immediately.

3.3 COMPOSITION

.1 Compacted thicknesses of materials and order of application for types of concrete paving required shall comply with the following table.

.1 Concrete paving, general:

Course	Vehicular Access mm	Sidewalks
Sub-base	450	300
Base	150	150
Concrete	200	150

.2 Refer to drawings for locations of concrete paving. Concrete pavement composition in driveways, within fire route or truck routes, or designated for parking, shall be as specified for vehicular access.

3.4 GRANULAR BASE AND SUB-BASE

.1 Obtain Consultant's approval of subgrade before placing granular sub-base/base.

.2 Place granular base and sub-base materials to lines and widths as indicated on drawings, to depths as specified above, and to Section 31 23 00, Excavation and Fill.

.3 Compact granular base and sub-base to 100% of its SPMDD.

3.5 **FORMWORK**

.1 Before proceeding with formwork, verify all lines and levels and ensure dimensions agree with drawings.

.2 Construct forms to produce finished concrete conforming to the shape, dimensions, locations and levels shown on the drawings.

.3 Keep form joints to a minimum.

.4 Clean formwork in accordance with CSA CAN3-A23.1.

.5 Obtain Consultant's approval of formwork, granular base and reinforcing steel prior to placing concrete. The proper time for form removal shall be approved by the Landscape Architect.

.6 Remove forms in accordance with CSA Standard CAN3-A23.1.

3.6 **REINFORCEMENT**

.1 Clean reinforcement of loose rust and mill scale.

.2 Place reinforcement as indicated on drawings.

.3 Place 10M tie bars at maximum 600 mm spacing and extend 300 mm into both sides of construction joints. Set half of tie bar lengths in capped sleeves to allow longitudinal movement.

3.7 **CONCRETE PAVEMENT**

.1 Obtain Consultant's approval of formwork, granular base and reinforcing steel prior to placing concrete.

.2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete and as specified herein.

3.8 **CONCRETE MIXING**

.1 Control concrete mix and source of materials to ensure batch to batch uniformity. Do not change cement type or manufacturer or source or type of aggregate or sand.

.2 Do not mix less than 3 cu.m. in any one batch. Where possible mix, deliver and place concrete of same colour in sequential pour on the same day. Finish at same time duration after placing.

.3 Do not pump concrete.

.4 Ensure minimum 130 revolutions of concrete batch before depositing.

3.9 CONCRETE PLACEMENT

.1 Protect adjacent surfaces when placing and finishing concrete and when applying curing compound.

.2 Coloured Concrete:
- .1 For coloured concrete pavements order and place sufficient concrete to complete continuous slabs in one pour.
- .2 Provide contrasting coloured paving at all curb ramps. Coordinate installation of tactile warning indicators, as indicated below.

.3 Immediately after floating, give pavements a uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom across the direction of travel.

.4 Apply concrete curing compound with airless sprayer at a rate to cover 7-10 sq.m. per litre.

.5 Place 10M rebar dowel into section of freshly poured concrete, where additional concrete abuts pour. Dowels to be embedded 300mm into fresh concrete and extend 300mm beyond face into proposed abutting concrete. Locate min. 50mm below surface and at 600mm O.C.

3.10 CURBS AND EDGES

.1 Verify lines, levels before proceeding with formwork and ensure dimensions agree with drawings.

.2 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated and within tolerances required by CAN/CSA-A23.1.

.3 Keep form joints to minimum.

.4 Clean formwork in accordance with CAN/CSA-A23.1 before placing concrete.

.5 Concrete edges to receive steel trowel final finish.

.6 Construct curb ramps for barrier-free access as shown and detailed.

.7 Construct poured concrete curbs for planters as detailed on Landscape drawings.

3.11 TOLERANCES

.1 Finish surfaces to within 3 mm in 3 m as measured with straightedge placed on surface.

3.12 EXPANSION AND CONTRACTION JOINTS

.1 Saw cut contraction joints in locations as shown on plan after concrete has set.

.2 Install expansion joints as indicated on plan, complete with premoulded expansion joint filler.

.3 Install expansion joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structures.

.4 Install joint filler in expansion joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.5 Seal expansion joints with sealant approved by Consultant, finished flush with top surface of concrete.

.6 Do not radius edges at expansion joints.

.7 Align curb, gutter and sidewalk joints.

3.13 **CURING**

.1 Curing of concrete slabs shall be effected by using well-lapped sheets, tarpaulins or heavy quality building paper laid down on the wetted surface of the slab which shall be continuously wet for a minimum of ten (10) days.

.2 Apply curing compound evenly to form continuous film. Follow manufacturer's instructions.

.3 By means acceptable to the Consultant and Authorities Having Jurisdiction, protect concrete from harmful effects of sunshine, drying winds and cold running of surface water for a minimum period of five days.

3.14 **PROTECTION AND CLEAN UP**

.1 Upon completion of any portion of the concrete work, remove all debris and excess materials from the site and leave in a neat and tidy condition to the satisfaction of the Consultant.

.2 Clean tactile tiles immediately prior to occupancy of the building, using method recommended by the manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Asphalt Paving	Section 32 12 16
.2	Concrete Paving and Curbs	Section 32 13 13
.3	Painting and Coating	Section 09 90 00

1.2 REFERENCES

.1	OPSS 710	Construction Specification for Pavement Marking
.2	OPSS 1716	Material Specifications for Water-Bourne Traffic Paint

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 23.

.2 Clearly mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number.

.3 Submit a Certificate of Compliance from the paint manufacturer indicating that the physical properties and chemical composition of the coatings conforms to the Ontario Provincial Standard Specification listed below.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Provide permanent pavement markings in accordance with OPSS 710. All pavement marking materials shall conform to OPSS 1716, Material Specifications for Water-Bourne Traffic Paint.

.2 Colours:

.1 White: generally all traffic lines and markings, parking lines, etc., unless noted otherwise. Play area pavement markings, unless otherwise indicated on drawings.

.2 Include for four (4) additional colours for play areas.

.3 Play area pavement markings to include:
- 2 hopscotch courses
- 2 half size basketball courts
- 1 soccer court
- 2 4-square games
- + additional lines indicated on Drawings

.4 Upon request, Consultant will supply a product list of paints applicable to work. Qualified paints may be used but Consultant reserves the right to perform further testing.

PART 3 - EXECUTION

3.1 EQUIPMENT REQUIREMENTS

.1 Paint applicator to be approved pressure type, mobile distributor capable of applying paint in double and dashed lines and that will ensure uniform application and having a positive shut-off.

3.2 CONDITION OF SURFACES

.1 Pavement surface to be free from surface water, frost, ice, dust, oil, grease and other foreign materials.

3.3 APPLICATION

.1 Apply pavement markings in accordance with OPSS 710, Construction Specification for Pavement Marking.

.2 Lay out pavement lines and markings.

.3 Application of traffic paints shall conform to OPSS 710, Construction Specification for Pavement Marking, for permanent pavement markings.

.4 Unless otherwise approved by Consultant, apply paint only when air temperature is above 10°C. and no rain is forecast.

.5 Apply 2 coats traffic paint evenly. First coat to be 10 mils wet. Second coat to be 15 mils. wet, applied after minimum 20 days.

.6 Do not thin paint unless approved by Consultant.

.7 Symbols and letters to conform to dimensions indicated.

.8 Apply other specified marking materials as directed by Consultant.

.9 Paint lines to be of uniform colour and density with sharp edges.

.10 Throughly clean distributor tank before refilling with paint of different colour.

.11 Apply paint using specified equipment only.

3.4 TOLERANCE

.1 Paint markings to be within plus or minus 10mm of dimensions specified.

3.5 PROTECTION OF COMPLETED WORK

.1 Protect pavement markings until dry to no pick up.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 Provide all materials, labour, and equipment for the compete installation of synthetic grass as indicated on drawings.

1.2 RELATED WORK

.1	Grading	Section 31 22 00
.2	Excavation and Fill	Section 31 23 00
.3	Topsoil	Section 32 91 00
.4	Sodding	Section 32 92 23

1.3 REFERENCES

.1 ASTM International:

.1	ASTM D1335	Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
.2	ASTM D1577	Standard Test Methods for Linear Density of Textile Fibers
.3	ASTM F1936	Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field
.4	ASTM D2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method
.5	ASTM D2859	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
.6	ASTM D5034	Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
.7	ASTM D5848	Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
.8	ASTM F1015	Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
.9	ASTM F1551	Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials
.10	ASTM F2898	Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method
.11	ASTM F3188	Standard Specification for Extractable Hazardous Metals in Synthetic Turf Infill Materials

.2 Synthetic Turf Council: Suggested Guidelines for the Essential Elements of Synthetic Turf Systems

1.4 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 23.
- .1 Shop Drawings shall include layout plans, details, seaming diagram, marking plans, perimeter conditions, and methods of attachment to other work.
- .2 Show installation methods and construction indicating clearances, measurements, terminations, drainage.
- .3 Show field verified dimensions on drawings.

.2 Product Data:
- .1 Provide manufacturer's data sheets for synthetic grass product and accessories. Include information on materials incorporated, and manufacturers' testing documents demonstrating the proposed system meets or exceeds all requirements specified.
- .2 Submit test results for the following:
  - .1 Pile (face weight), primary backing system weight, and secondary backing system weight, tested in accordance with ASTM D5848
  - .2 Yarn Denier tested to ASTM D1577
  - .3 Yarn Breaking Strength tested to ASTM D2256
  - .4 Tuft Bind tested to ASTM D1335
  - .5 Grab Tear Strength tested to ASTM D5034
  - .6 Flammability tested to ASTM D2859, Pill Burn
  - .7 Impact Attenuation to ASTM F1936
- .3 Provide manufacturer's printed installation instructions.

.3 Samples:
- .1 Submit two samples of proposed synthetic turf, minimum 600mm x 600mm, demonstrating a panel to panel seam and representative of finished synthetic grass surfacing system.

.4 Submit manufacturer's maintenance instructions, for inclusion in maintenance manuals specified in Section 01 78 00.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver and store components in unopened packaging, with manufacturer's labels intact and legible.

.2 Inspect all delivered materials and products to ensure they are received undamaged and in good condition.

.3 Protect from damage during delivery, storage, handling and installation.

.4 Comply with manufacturer's recommendations for storage and handling of products.

PART 2 - MATERIALS

2.1 **MATERIALS**

.1 Synthetic grass surfacing shall be 80 oz. Saratoga with Tan and Green Thatch by AGL Grass.
- .1 Equivalent products will be accepted from Tarkett FieldTurf or Rymar Grass.

.2 Characteristics:

.1	Face Weight:	2.7 kg/m^2 (80 oz. per square yard)
.2	Primary Backing:	Triple layer backing with reinforced stabilizer
.3	Secondary Backing:	Polyurethane coating.
.4	Drainage:	760mm (30") per hour.
.5	Infill:	None

.3 Synthetic grass shall be fabricated of ridged monofilament polyethylene fibres tufted into a primary backing, with a secondary backing.

.4 Secondary backing shall consist or an application of porous, heat-activated polyurethane to permanently lock the fibres in place.

.5 Fiber shall be min. 9,000 denier, low friction, and UV-resistant fibre measuring not less than 40mm high.

.6 Glue, thread, paint, seaming fabric and other materials used to install and mark the synthetic grass surface shall be as recommended by the synthetic grass manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION OF SITE

.1 Inspect the base on which the Work of this section is to be installed. Granular base and subbase are specified in Section 31 23 00, Excavation and Fill.

.2 Verify that base grading and compaction has been adequately performed and is suitable for the installation of the synthetic grass. Inform the Consultant, in writing, of any issues which could compromise the successful installation of the synthetic grass surfacing. Commencement of the Work of this section will imply acceptance of existing conditions.

3.2 INSTALLER

.1 The installer must be acceptable to the turf manufacturer for the installation of their material, including gluing seams. Only trained technicians, skilled in the installation of synthetic turf systems, and working under the direct supervision of the approved installer, shall undertake any cutting, sewing, gluing, shearing, or other application tasks.

3.3 INSTALLATION

.1 Perform work in strict accordance to the Drawings, shop drawings, specifications, and manufacturer's printed instructions.

.2 Immediately prior to application of synthetic grass surfacing, clean base thoroughly to remove all foreign materials, soil, or any other substances that may be detrimental to permeability and compromise the successful installation of the surfacing.

.3 Inspect all materials prior to commencing application. Ensure materials are supplied as specified, are not damaged or defective, and are supplied in adequate quantities.

.4 Install synthetic turf shall be installed directly over the properly prepared aggregate base. Take care to avoid disturbing the aggregate base, both in regard to compaction and planarity.

.5 Repair and properly compact any disturbed areas of the aggregate base as recommended by manufacturer

.6 Install synthetic grass surface with seams flat, tight, and permanent, with no separation or fraying.

.7 Upon completion of installation, inspect turf to ensure successfully application, including seaming, adhesive bonding, uniformity of colour of turf, bubble-free surface smoothness as laid, field markings, insert installations, and edge details. Replace or repair areas of substandard materials or workmanship prior to requesting review by the Consultant for acceptance of the Work.

3.4 **CLEAN UP AND PROTECTION**

.1 The area shall be left clean, neat and free of any debris resulting from the synthetic turf installation. Dispose of surplus material off site.

.2 Inspect installation with a hand held metal detector and remove any metal debris located.

.3 Protect completed installation from damage during the remainder of the construction period. Remove such protection immediately prior to occupancy of building by Owner.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Asphalt Paving Section 32 12 16

1.2 REFERENCES

.1 Safety surfaces installed shall exceed the performance requirements for impact attenuation and Head Injury Criteria as per CSA Z614 Standards confirming a maximum deceleration of no more than 200 gmax and a HIC value of no more than 1000 as per ASTM F-1292 and CSA Z-614 method of testing.

.2 The impact attenuation performance shall be documented by a certificate of compliance and shall be performed using Triax 2000 non-destructive testing apparatus within 30 days of installation.

.3 Installed Surfaces shall achieve a HIC value of less than 700 and gmax values of less than 125.

1.3 STANDARDS

.1 The installed play surface will meet:
- .1 ASTM. F-1292 standard specification for impact attenuation of surface systems under and around playground equipment and HIC values as per CPSC guidelines.
- .2 CAN/CSAA-Z614 guidelines on children's play spaces and equipment.

1.4 SUBMITTALS

.1 The following shall be submitted:
- .1 Manufacturers description of product, installation methods, base preparation and maintenance instructions.
- .2 Detailed shop drawings of safety surfacing edging details, material thickness and base construction.
- .3 Detailed shop drawing of fibar felt filler fabric, showing layout of drainage.
- .4 Test results confirming product has been tested and in compliance with ASTM F- 1292 and CAN/CSA Z614.

PART 2 - MATERIALS

2.1 ENGINEERED WOOD FIBER SURFACE

.1 FIBAR wood fibre play surfacing, Fibar System 300 (12") as manufactured by Fibar Systems, 1-800-342-2721, or approved equivalent.

.2 Fibar drain covered with Fibar felt.

2.2 FILTER FABRIC

.1 Fibar felt.

2.3 **ADDITIONAL DRAINAGE**

.1 Perforated plastic drainage tile, 150mm diameter complete with filter sock, at mulch play area perimeter, connect to nearest catch basin or as indicated on Drawings. Refer to 33 46 00 'sub-drainage".

.2 150mm depth compacted granular 'A' for trench.

2.4 **BASE**

.1 150mm depth compacted clear stone.

PART 3 - EXECUTION

3.1 **EXCAVATION FOR PLAY AREA**

.1 Excavate play areas to depth as necessary to accommodate Fibar at the required play surface thicknesses.

.2 To accommodate play surface thickness changes relating to equipment heights dig base layer down in steps to accommodate the change in thickness of the play surface.

.3 Prior to placement of Fibar, the surface is to be proof-rolled and approved by the testing company.

.4 Install Fibar drain as required to ensure appropriate drainage under all play areas. Outlet drains at low point at nearest catch basin.

3.2 **PLAY SURFACES**

.1 Play surface to be installed with thickness appropriate to achieve performance criteria as outlined above. Play surface thickness is correlated with the height of the play equipment components.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Decorative Gates	Section 32 31 20

1.2 REFERENCES

.1	ASTM A53M	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
.2	ASTM A90M	Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
.3	CAN/CSA-A23.1-M	Concrete Materials and Methods of Concrete Construction.
.4	CAN/CSA-G164-M	Hot Dip Galvanizing of Irregularly Shaped Articles.
.5	CAN/CGSB-138.1-M	Fence, Chain Link, Fabric.
.6	CAN/CGSB-138.2-M	Fence, Chain Link, Framework, Zinc-Coated, Steel.
.7	CAN/CGSB-138.3-M	Fence, Chain Link - Installation.
.8	CAN/CGSB-138.4-M	Fence, Chain Link, Gates.
.9	CGSB 1-GP-181M	Coating, Zinc-Rich, Organic, Ready Mixed.

1.3 SCOPE OF WORK

.1 Work includes supply and installation of 1200mm, galvanized chain link fence and gates, including all posts, miscellaneous hardware, outriggers, accessories and concrete footings as detailed or required for a complete installation of black vinyl chain link fencing.
Refer to Septic Drawings for fence surrounding new sewage tanks. Fence to be provided by Sewage Contractor.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 23. Shop drawings shall indicate locations of posts, all fencing materials and hardware.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: to Section 03 30 00, Cast-in-Place Concrete, and CAN/CSA-A23.1.

.2 Chain-link fence fabric: to CAN/CGSB-138.1 with 38mm x 6 ga. mesh, zinc coated before weaving.

.3 Posts, braces and rails:

.1 to CAN/CGSB-138.2, hot dipped galvanized tubular schedule 40 steel pipe. Proper cleaning and preparation of the materials prior to finishing is required.

.1 End and straining posts: 89.0mm O.D.
.2 Line posts: 60.0mm O.D.
.3 Rails and braces: 43.0mm O.D.
.4 Gate frames: 43.0mm O.D.

.4 Tie wire fasteners: single strand, steel wire conforming to requirements of fence fabric, 6 gauge.

.5 Stretcher bar: minimum 5 x 19mm, galvanized steel.

.6 Stretcher bar bands: minimum 5 x 19mm, galvanized steel.

.7 Fittings and hardware:

.1 to CAN/CGSB-138.2, cast aluminum alloy, galvanized steel or malleable or ductile cast iron.

.2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.

.3 Hot dipped galvanized and PVC coated.

.8 Grounding Rod: 16mm diameter x 3000mm long, copper well rod.

.9 Tension Wire: 6 gauge spring coil.

2.2 **FINISHES**

.1 Galvanizing:

.1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
.2 For pipe: 550 g/m2 minimum to ASTM A90.
.3 For other fittings: to CAN/CSA-G164.

.2 Refer to drawings to confirm locations of fencing.

2.3 **CONCRETE**

.1 Concrete mixes and materials to conform to Section 03 30 01, Cast-in-Place Landscape Concrete, and CAN/CSA-A23.1.

PART 3 - EXECUTION

3.1 ERECTION OF CHAINLINK FENCE

.1 Erect fence along lines as indicated and in accordance with CAN/CGSB-138.3.

.2 Excavate post holes to dimensions indicated.

.3 Space line posts as indicated in details, maximum 3048mm or 2500mm apart, measured parallel to ground surface.

.4 Install end posts at ends and corners of fence, and at gates.

.5 If distance between end or corner posts exceeds 150 metres, provide straining posts equally spaced at maximum 150m o.c. Install additional straining posts at sharp changes in grade.

.6 Place concrete in post holes and embed posts into concrete to depths indicated. Ensure that concrete is not above ground level. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set. Concrete for bases shall be 20 Mpa concrete at 28 days in accordance with Division 3 of these specifications.

.7 Do not install fence fabric until concrete has cured a minimum of 5 days.

.8 Install brace between end posts and nearest line posts and between; gate posts and nearest line posts; and on both sides of corner and straining posts. Braces to be placed in centre of panel, parallel to grade.

.9 Install top and bottom rails between posts and fasten securely to posts and secure waterproof caps.

.10 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300mm intervals. Knuckled selvedge to be located at bottom and top.

.11 Secure fabric to top rails, line posts and bottom rail with tie wires at maximum 475mm intervals. Give tie wires minimum two twists.

.12 Nuts and Bolts for fittings shall be installed with the head on the exposed side of the fence. Bolts shall be peened over to prevent removal of the nut.

.13 Clean fence and touch up finishes at completion of installation.

3.2 GATE INSTALLATION

.1 Swing gateposts shall be installed in accordance with ASTM F 567. Direction of swing shall be as indicated on drawings.

.2 Gates shall be plumb in the closed position having a bottom clearance of maximum 50mm. Hinge and latch offset opening space shall be no greater than 75mm in the closed position.

.3 Determine position of centre gate rest for double gate. Cast gate rest in concrete. Concrete to be sloped to drain water.

3.3 **ELECTRICAL GROUNDING**

.1 Provide grounding, which shall be installed by a licensed electrician.

3.4 **CLEAN UP**

.1 The area shall be left clean, neat and free of any debris resulting from the fence installation. Dispose of surplus material off site.

.2 Touch up paint work as required and to the satisfaction of the Landscape Architect.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Sodding	Section 32 92 23
.2	Exterior Plants	Section 32 93 00

1.2 SUBMITTALS

.1 Refer to Soil Test Report included in Geotechnical Report.

.2 Submit topsoil tests (minimum 3) from imported topsoil.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Stockpile topsoil to prevent deterioration.

.2 Stockpile to be left for longer than 3 months shall be seeded with buckwheat to prevent weed infestations.

.3 Avoid excessive handling of topsoil.

.4 Do not move while in a wet or frozen condition.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Topsoil: Fertile and friable loam (45% sand, 35% silt, and 20% clay) with a minimum 2% organic matter content prior to mixing with acidity values between pH 6.0 and 7.5, free from admixtures of subsoil, clay lumps, stones or roots over 50mm in diameter, toxic chemicals or any other foreign matter. Texture of imported topsoil to match existing topsoil as amended.

.2 Fertilizer: A complete commercial fertilizer, containing 60% slow release nitrogen. Fertilize with custom mix of Nitrogen/Phosphate/Potash as follows:

Garden	Play field
Nitrogen 2%	Nitrogen 0%
Phosphoric Acid 5%	Phosphoric Acid 12%
Potash 4%	Potash 4%

.3 Manure: well rotted, unleached cattle manure, not less than 8 months and not more than 2 years old, free of harmful chemicals and injurious substances, containing not more than 25% straw, leaves and other foreign matter.

2.2 SOD AREAS

.1 Topsoil: All topsoil must be imported and must be of a sandy loam texture which will permit a maximum inclusion of topsoil with the sand within the construction that the final mix shall not contain more than twenty-five percent (25%) silt plus clay.

.2 Fertilizer: to meet garden soil specifications.

PART 3 - EXECUTION

3.1 DEPTH OF TOPSOIL

.1 Playing Field: 200mm unless otherwise shown.

.2 Planting Beds: 300-450mm unless otherwise shown

.3 General Sodded Areas: 150 mm unless shown otherwise.

3.2 PREPARATION OF PLANTING MIXTURE FOR EXTERIOR PLANTS

.1 Thoroughly mix together 9 parts topsoil and 1 part peatmoss and shred to a fine, even texture.

.2 To each cubic metre of mixture, add 1.5kg bonemeal (0-20-0) and fertilizer as recommended by soil tests.

.3 Protect planting mixture to prevent deterioration.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Topsoil Section 32 91 00
.2 Grading Section 31 22 00

1.2 SOURCE QUALITY CONTROL

.1 Obtain approval from Consultant of source of sod.

.2 When proposed source of sod is approved, use no other source without written authorization.

1.3 SCHEDULING

.1 Schedule sod laying to coincide with topsoil operations.

1.4 PROTECTION

.1 The Contractor shall protect all sodded areas with warning signs and temporary fencing, at the Contractor's expense.

.2 Provide chain link fence to completely enclose all newly sodded areas.

.3 Fence shall remain on site for a period of up to one year from date of completion of sod. Remove fence when instructed to do so by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Number One Turfgrass Nursery Sod: Sod that has been especially sown and cultivated in nursery fields as turfgrass crop and is harvested with a mechanical sod cutter to a thickness of not less than 25 mm and not more than 40 mm, and is supplied in rolls of approximately 0.9 sq m in surface area. Quality and source to comply with standards outlined in Canadian Standards for Nursery Stock, most current edition, published by the Canadian Nursery Landscape Association.

.2 Sod establishment support: wooden pegs: 17 x 8 x 250 mm.

.3 Water: As supplied on site.

.4 Fertilizer:

.1 To Canada 'Fertilizers Act' and 'Fertilizers Regulations'.

.2 Complete synthetic, 5-20-20 slow release with minimum 50% of nitrogen content in ureaformaldehyde form.

PART 3 - EXECUTION

3.1 LAYING OF SOD

.1 Prior to sodding, submit survey and obtain confirmation from Consultant that finished grade and depth of topsoil are satisfactory.

.2 Lay sod within 36 hours of being lifted.

.3 Sodding during excessively wet conditions, at freezing temperatures or over frozen soil is not acceptable.

.4 Lay sod in rows, perpendicular to slope, and with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.5 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.6 Water sod immediately after laying to obtain moisture penetration into top 100mm of topsoil.

.7 Stake sod on slopes of 33% or more.

3.2 MAINTENANCE

.1 Maintain sodded areas, including cutting, from start of installation until Substantial Performance of the Work or for a minimum of 60 days after installation, whichever is the longer.

.2 Water sodded areas in sufficient quantities and at frequency required to maintain soil under sod continuously moist to depth of 75mm to 100mm.

.3 Cut grass when required to maintain a maximum height of 60mm. Remove clippings which will smother grassed areas. Cut minimum of two (2) times.

.4 Maintain sodded areas weed free.

.5 Fertilize sodded areas one month after sodding with 2:1:1 ratio fertilizer. Spread fertilizer evenly at rate of 0.5 kg of nitrogen/100m2 and water well.

3.3 ACCEPTANCE

.1 Sodded areas will be accepted at final review provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots and without weeds.

.3 No surface soil is visible when grass has been cut to height of 60mm.

.4 Sodded areas have been cut minimum two times.

.2 Areas sodded in fall will be accepted in following spring, one month after start of growing season, provided acceptance conditions are fulfilled.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Topsoil Section 31 91 00

.2 Sodding Section 32 92 23

.3 Grading Section 31 22 00

1.2 SOURCE QUALITY CONTROL

.1 Obtain approval by Consultant of plant material at source.

.2 Notify Consultant of source of material at least 7 days in advance of shipment. No work under this section is to proceed without approval.

.3 Acceptance of plant material at its source does not prevent rejection on site prior to or after planting operations.

1.3 SHIPMENT AND PRE-PLANTING CARE

.1 Co-ordinate shipping of plants and excavation of holes to ensure minimum time lapse between digging and planting.

.2 Tie branches of trees securely and protect plant material against abrasion, exposure and extreme temperature change during transit. Avoid binding of planting stock with rope or wire which would damage bark, break branches or destroy natural shape of plant. Give full support to root ball of large trees during lifting.

.3 Cover plant foliage with tarpaulin, to prevent loss of moisture during transit and storage. Wind burned plant material will be rejected upon delivery and must be removed from the site within 24 hrs of rejection.

.4 Remove broken and damaged roots with sharp pruning shears.

.5 Keep roots moist and protected from sun and wind. Heel-in trees, which cannot be planted immediately, in shaded areas and water well.

1.4 SITE CONDITIONS

.1 Environmental Requirements: Plant only in suitable weather conditions and season for each specified material.

.2 Layout of Work: Lay out planting beds and stake tree and shrub locations. Obtain Architect's approval of layout before starting work.

1.5 **SUBSTITUTIONS**

.1 Make plant material available for inspection at source by Architect.

.2 Approval of plant material at source shall not impair the right of the Architect to inspect plants upon arrival on the site or during the course of construction and to reject plants which have been damaged, or which, in any way, do not conform to the specifications.

.3 If partial acceptance is desired, give notice to the Architect in writing.

.4 Partial acceptance will be given when planting work has been delayed due to circumstances beyond the control of the contractor or where planting would be in discordance with good horticultural practices and would jeopardize the performance of the work and plants.

.5 All plant material will be inspected prior to acceptance and at the end of the specified warranty period. All plants must be in a healthy, vigorous, growing condition at the time of this inspection.

1.6 **WARRANTY**

.1 Provide a written warranty that plant material as itemized on plant list will remain free of defects for two full growth seasons.

.2 Attend end-of-warranty review, conducted by Consultant. Record any defective items, and promptly replace, subject to weather and season.

1.7 **REPLACEMENTS**

.1 During warranty period, remove from site any plant material that has died or failed to grow satisfactorily as determined by Consultant and replace with plants of identical species and sizes.

.2 Extend warranty on replacement plant material for a period equal to the original warranty period.

.3 Continue such replacement and warranty until plant material is acceptable.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 (8x) Pinus Negra south parking lot.
(12x) Redpoint Maple (60mm), elsewhere. Condition W.B..

.2 Water: potable and free of minerals which may be detrimental to plant growth.

.3 Stakes: 50x50x2400mm length wooden stakes

.4 Accessories: No.10 galvanized steel wire encased in 12mm dia. new black two ply rubber hose.

.5 Root ball burlap: 150g Hessian burlap.

.6 Wire baskets: to be ungalvanized metal.

.7 Rodent protection:200x400mm ht. min. flexible white plastic tree wrap

.8 Mulch: Fibar system 300 - refer to Section 32 18 16 Playground Protective Surfaces.

.9 Anti-desiccant: wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

2.2 **ADDITIONAL PLANT MATERIAL QUALIFICATIONS**:

.1 Plant material obtained from areas with milder climatic conditions from those of site acceptable only when moved to site prior to the breaking of buds in their original location and heeled-in, in a protected area until conditions suitable for planting.

.2 Use trees with strong fibrous root system free of disease, insects, defects or injuries and structurally sound. Use trees with straight trunks, well and characteristically branched for species. Plants must have been root pruned regularly, but not later than one growing season prior to arrival on site.

.3 Cold storage: written request and approval required for plant material which has been held in cold storage.

.4 Container-grown stock: acceptable if containers large enough for root development. Plants must have grown in container for minimum of one growing season but not longer than two. Root system must be able to "hold" soil when removed from container. Plants that have become root bound are not acceptable. Container stock must have been fertilized with slow releasing fertilizer.

.5 Balled and burlapped: coniferous and broad-leafed evergreens over 500mm. tall must be dug with soil ball. Deciduous trees in excess of 3m height must have been dug with large ball. Root balls must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap and heavy twine, rope or a wire basket.

.6 Collected plant material: will not be permitted.

.7 Substitutions to plant material as indicated on planting plan not permitted unless written approval has been obtained as to type, variety and size. Plant substitutions must be of similar species and of equal size as those originally specified.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Scarify subgrade surfaces to a depth of 75mm in areas where topsoil will be placed to produce an even, loose-textured surface, free from live weeds and stones, roots, branches and similar materials larger than 75mm.

.2 Excavate plant pits as specified on drawings for particular soil type. Provide minimum 300mm depth of planting soil mixture at all planting beds.

.3 All pits and beds shall be shaped and prepared as to allow for free drainage from the excavation.

.4 Remove rock, existing and abandoned construction work, or similar obstructions to 150mm below bottom of pit.

.5 Dispose of surplus excavated materials away from site.

.6 Prevent freezing of bottom of plant pits.

.7 Excavate plant pits to receive frozen root balls while soil is unfrozen, and mulch with straw to protect from freezing until trees are planted.

3.2 PLANTING

.1 Planting shall be done during periods suitable with respect to weather conditions and locally accepted practice.

.2 Handle plants carefully, supporting entire plant while moving.

.3 Face trees and other plant materials to give the best appearance or relationship to adjacent structures and to the approval of the Landscape Architect.

.4 Tag specimen trees (over 75mm in calliper) in the nursery and install with the same north-south orientation on site.

.5 Fill tree pits with topsoil to prevent air pockets or excessive compaction and water thoroughly.

.6 Provide an earth saucer at the base of each plant with a diameter as large as the excavated area.

.7 After plant installation, remove all labels attached by wire or cord.

3.3 TREE WRAPPING

.1 Wrap the main stem of each tree having a calliper of 50mm or greater.

.2 Apply wrapping in a spiral manner with one-half overlap, each time starting at grade and extending upwards to just above the second branches.

.3 Make sure all wrapping is neat and snug and held in place by suitable cord. All areas of contact with support systems shall be double wrapped.

3.4 **PLANT SUPPORT**

.1 Stake or guy all plants as shown on drawings for individual materials with all supports, guys and fasteners snug and secure.

.2 Space stakes equally around plant and drive into undisturbed soil

3.5 **PRUNING**

.1 Do not prune plants except to remove dead or injured branches.

.2 Prune in such a manner as to preserve the natural character of the plants. Do not remove leaders.

3.6 **ADJUSTMENT**

.1 After settlement has occurred in planting pits or beds, fill in to specified grade with planting soil and mulch as specified.

3.7 **MAINTENANCE**

.1 Maintain all plant materials and continue until the Date of Certificate of Total Performance.

.2 Maintain all plants in vigorous and healthy growing condition, including, but not limited to:
- .1 Cultivating and weeding of planting beds and tree pits.
- .2 Watering when required and sufficiently to saturate the root system.
- .3 Pruning, including the removal of dead or broken branches and treatment of pruning wounds.
- .4 Disease and insect control when require
- .5 Maintain all accessories in good condition.

.3 At time of final inspection for Certificate of Substantial Completion and Certificate of Total Performance, all planting beds and tree pits shall be freshly cultivated, free of weeds, leaves, broken branches and rubbish and in a neat and tidy condition.

.4 Notwithstanding any provisions in the contract documents, be responsible for making monthly inspections of all plantings during the warranty period and submit a written report of each inspection to the Landscape Architect and Owner.

.5 Instruct the Owner in writing of any corrective or preventative measures necessary to ensure healthy plant growth. Any damage to plant materials from any source whatsoever shall be reported in writing to the Landscape Architect and Owner.

.6 Provide written warranty for two years from date of substantial performance. Replace any exterior plants which in the opinion of the Consultant, are not in acceptable condition at the end of the warranty period.

3.8 **GUARANTEE**

.1 All plant materials shall be guaranteed for a minimum of 1 year from the date of written Landscape Certification for Commencement of Plant Warranty as granted by the Town of Caledon, and until final certification is granted by the Town of Caledon. Plants which do not survive satisfactorily during the guarantee period shall be replaced at no extra cost to the owner. Plant material which is replaced due to unsatisfactory performance shall, in full be guaranteed for another minimum of 1 year, or until final acceptance is granted by the municipality.

.2 Similarly, all other landscape work performed under this contract shall be fully guaranteed for the above specified period.

.3 All work shall be inspected at the end of the guarantee period, at which time a final certificate shall be issued by the Landscape Architect and submitted to the Town for their inspections, preparation of a guarantee certificate, final approvals and release of funds.

.4 At the end of the guarantee period, the Contractor shall remove all tree stakes, rodent guards and bark wrap and all extra mulch where necessary.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Demolition & Alterations	Section 02 40 00
.2	Topsoil	Section 31 91 00
.3	Asphalt Paving	Section 32 12 16
.4	Concrete Paving and Curbs	Section 32 13 13

1.2 GENERAL

.1 Site Conditions

.1 Underground utility lines or other buried objects not shown on landscape plan are the responsibility of the Contractor and must be established in location and depth before commencing work.

.2 Protection

.1 Prevent damage to trees, landscaping, natural features, bench marks, surface or underground utility lines, which are to remain. Make good any damage.

.3 Existing Boulders

.1 Remove, store temporarily and relocate existing boulders to locations shown on drawings and install to these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Limestone:

.1 Boulder Retaining Wall / Seating. Blocks to be Wiarton limestone custom length to suit 1200 x 500 x 550mm ht. c/w guillotined front and exposed ends. Natural bottom, sawn top and abutting ends to allow for placement with no gaps. Provide 15mm, 20 degree chamfer edges. Flame finish visible sawn ends. As supplied by Beaver Valley Stone or approved equal, (416-222-2424).

.2 Bedding and backfill material:

.1 Granular 'A', conforming to OPSS.

.3 Filter Fabric:

.1 'Terrafix 270R' by Terrafix Geosynthetics Inc., Rexale Ontario, or approved equal, (416) 674-0363.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine surfaces and conditions upon which work of this Section depends. Commencement of work will denote acceptance of surfaces and conditions.

.2 Asphalt Paving Section 32 12 16

3.2 PREPARATION

.1 Verify dimensions and grades on site and make minor adjustments to suit site conditions and to Landscape Architect's approval. Report any discrepancies to Consultant prior to placing stone.

.2 Remove any unconsolidated soils or deleterious material from bedding area.

.3 Face bedding course as specified to the satisfaction of Owner prior to placing any stone.

3.3 INSTALLATION

.1 The subgrade shall be graded smooth and compacted to 98% Standard Proctor Maximum Dry Density.

.2 All pieces shall be bedded in 150mm granular ‘A’. Ensure minimum 500mm overlap of joints in successive courses, where height exceeds one course.

.3 Steps shall be uniform height to match grade conditions.

3.4 COMPLETION

.1 Upon completion of the work in this section, remove surplus materials, tools, equipment and debris, and leave site in a clean and tidy condition to the complete satisfaction of the Owner.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 The work covered by this specification includes the supply of all labour, materials, consumables and equipment for:

.1 Installation and maintenance of sediment and erosion control measures as specified on the Contract Drawings.

.2 Excavating and backfilling of trenches for pipes, conduits and appurtenances. The work includes; but is not limited to the following; sheet piling, sheathing, shoring and bracing, installation and operation of all equipment required for de-watering excavations and control of ground and surface water; protection and supporting of existing structures and utilities; removal of all debris and surplus material; compaction of the backfill, rough grading and restoration of surfaces; maintenance of existing travel on streets and roads and access to private and public property and each and everything required to complete the work as specified. Comply with safety requirements of the Federal and Provincial Governments and of the local municipal authority.

.3 The installation of sewers, fittings, drain connections, manholes, frame and covers, necessary for the complete construction, testing and flushing of the sewer systems to 1.5 metres beyond the outside face of building walls as specified in the specification and/or on the Contract Drawings.

.4 The installation of sub-drain connections to the catchbasins, as specified in the specifications and/or the Contract Drawings.

.5 The installation of watermains, fittings, valves, service connections, cathodic protection, tracer wire and any other appurtenances necessary for the complete construction, testing, chlorination and flushing of the water distribution system as specified in the specifications and/or on the Contract Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1	Excavation and Fill	Section 31 23 00
.2	Sub-Drainage	Section 33 46 00
.3	Building mechanical work	Divisions 22, 23

1.3 REFERENCES

.1 CSA Group

.1	CSA A257 Series	Standards for concrete pipe and manhole sections
.2	CSA B137 Series	PE, PA and PEX Piping Systems for Gas Package
.3	CSA B1800	Thermoplastic Nonpressure Piping Compendium

.2 American Water Works Association

.1	AWWA C110	Ductile-Iron And Gray-Iron Fittings
.2	AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
.3	AWWA C509	Resilient-Seated Gate Valves for Water Supply Service

.4	AWWA C601	Standard for Disinfecting Water Mains
.5	AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 60 in. (100mm Through 1,500mm)
.6	AWWA C907	Standard for Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 in. Through 12 in. (100mm Through 300mm), for Water, Wastewater, and Reclaimed Water Service

.3 Abandon Monitoring Well

.1	Reference OPSS 510	All work to be completed in accordance with the Ontario Water Resources Act, R.R.O. 1990, Regulation 903 (as amended) requirements for well abandonment.

1.4 **GENERAL**

.1 Comply with Division 01, General Requirements, and all documents referred to therein.

.2 All construction to be carried out in accordance with the most current design criteria, standards and specifications of the Municipality, the Region, and OPSD/OPSS.

.3 The Contractor shall arrange and pay for all necessary permits, fees, inspections and complete restoration whether on site or on any other property affected by the work.

1.5 **DEFINITIONS**

.1 For excavation work, only two classes of excavation shall be considered, namely earth excavation and rock excavation.

.2 Earth excavation under this contract shall comprise deposits of whatever nature, including shale that does not come under the classification of rock. For the purpose of this Contract, earth excavation shall include both surface and buried boulders regardless of size. All boulders shall be removed and disposed of off site at no extra cost.

.3 Rock excavation shall be defined as material, which cannot be reasonably removed with a conventional trenching backhoe outfitted with either a Avee@ bucket or ATiger Teeth@. Blasting shall not be permitted without written authorization from the Consultant.

1.6 **PROTECTION**

.1 All existing utilities shown on the drawings are for reference purposes only. The Contractor shall be responsible for the field stakeout of all existing utilities on-site and off-site and shall be responsible for adequately protecting all existing utilities and services within the construction area. Furthermore, any damage to the existing utilities by the Contractor, or the activities of his subcontractors or suppliers shall be repaired at the expense of the Contractor. The Contractor shall be responsible to expose all existing stubs, services, and utilities prior to commencement of construction and to verify all existing inverts, depths, etc. to verify no conflicts exist. If a conflict exists, it shall be reported to the Engineer immediately. Work shall not proceed until the conflict is resolved.

.2 The Contractor shall record location of maintained, re-routed and abandoned underground lines.

1.7 **UTILITY SERVICES**

.1 The Contractor shall ensure that all existing hydrants, valve boxes, curb stop boxes, fire or police call boxes, or any other utility controls remain unobstructed and accessible during the construction of the work.

.2 The Contractor shall not operate any valve, switch, or other control in any existing utility services without the written approval of the Architect and the utility concerned. All consumers affected by such operation shall be notified in writing by the Contractor a minimum of 48 hours before the operation and shall be advised of the probable time when service will be restored.

.3 The Contractor shall pay all claims, damages, and all required rectification caused by his failure to comply with items .1 and .2 of this subsection.

1.8 **BARRIER AND LIGHTS**

.1 The Contractor shall, at his own expense, supply, erect and maintain all required barriers, fences, lights, signage, etc., as may be necessary, or as ordered by the Architect, to ensure safety to the Public and to those engaged in any activities around and about the work.

1.9 **NOTIFICATION OF AGENCIES**

.1 The Contractor shall be responsible for fully complying with the requirements of all official and other agencies governing all or any part of the work under this Contract. These requirements may affect methods of installation and construction methods and may include written notification of the appropriate authority prior to commencement of the Contract. Where a written notification of the above authorities is required, a copy of the said notification shall be submitted to the Architect. Work commencement notices required by the Municipality or Region shall be submitted at minimum 48 hours prior to the start of the work.

1.10 **SUBMITTALS**

.1 Submit product data sheets for all products specified herein and on site servicing drawings.

.2 Submit shop drawings for catchbasins, manholes, and stormwater quality control device.

.3 Submit manufacturer's inspection report for installation of stormwater quality control device.

.4 Submit the following documents, which are required by Authorities Having Jurisdiction for the release of securities. Refer to Section 01 78 00, Closeout Submittals, for value assigned to closeout submittals.

.1 Submit sewer video inspection report on DVD disk, including report.txt, summary.txt, sewer.dat files and camera video with a separate file for each sewer line. One hard copy of the report is also required.

.2 Submit as-built site servicing information including lateral location sheets, final measurement sketches, plan and profile drawings, sanitary design sheets, shop drawings and as-built drawings in AutoCAD format. Provide digital copies on a DVD and one printed copy of all documents.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fill materials shall conform to the requirements of Section 31 23 00, Excavation and Fill, and these specifications. The Contractor shall advise the Consultant of the supplier(s) of the bedding aggregates prior to commencement of construction so that adequate samples can be obtained for grain size distribution testing.

.2 All granular materials shall conform to the requirements of OPSS form 1010.

.3 Storm and Sanitary Sewer bedding:

.1 The subgrade of trenches must be inspected and approved by qualified field personnel from the soils engineering company. Pipe bedding will be as per S-200.010 Durham Region Standard for PVC Pipe.

.4 PVC Gravity Storm Sewer Pipe: PVC gravity storm sewer pipe shall Conform to CSA Specification B182.1 or B182.2, or the latest revisions thereof. Dimension ratio (DR) of PVC sewer pipe shall be 35.Concrete pipe shall conform to the requirements of CSA Specification A257 for the classes shown below:

.1 Non-reinforced Concrete Pipe, CSA Standard A257.1 Class 1, 2 and 3.
.2 Reinforced Concrete Pipe, CSA Standard A257.2 Strength Class 50-D, 65-D, 100-D and 140-D.

Watertight bell and spigot connections will be required for all pipe joints.

.5 Catchbasins to be as per OPSD 705.010 with frames and grates as per OPSD 400.020.

.6 All PVC gravity sanitary sewer pipe shall conform to CSA Specification B182.1 or B182.2, or the latest revision thereof. Dimension ratio (DR) of PVC sewer pipe shall be 35.

.7 Sewer Connections: Sewer connections to manholes shall be done by means of a PVC manhole adaptor.

.8 All Storm manholes shall be supplied in accordance with the Municipality and OPSD standards.

.1 Precast manholes shall conform to meet M.O.E. specifications and conform to OPSD 701.01 to 701.04.

.2 Ladder rungs shall be solid rectangular aluminum as shown in OPSD 406.010

.3 Manhole covers shall be Type B as shown in OPSD 401.010.

.4 Safety Grates are to be provided for manholes whose depth exceeds 5m.

.9 All sanitary manholes shall be supplied in accordance with the Region.

.1 Precast manholes shall conform to meet M.O.E. specifications and Region's standards.

.2 Manhole steps shall be solid rectangular aluminum as shown in OPSD 405.020

.3 Manhole covers shall be Type A as shown in OPSD 401.010.

.10 All watermain piping, hydrants and valves to be tested in accordance with ULC or equivalent testing. All watermain piping, fittings and appurtenances shall be ULC labeled.

.11 Watermain bedding will be as per S-200.010 Durham Region Standard for PVC Pipe.

.12 Watermain piping to be PVC manufactured in accordance with the latest edition of AWWA C900. Minimum Class 150 (DR18) shall be used. When using PVC watermain, a tracer wire shall be provided along the top of all watermains. The wire is to be secured to the top of the watermain at every fitting and valve and at intervals not to exceed 3.0 metres. All tracing wire shall be 12 gauge, standard copper wire complete with outer plastic coating. Tracer wire shall be connected to valves in chambers and the tracer wire is to be carefully extended along the bottom of the chamber, up the backside of the steps along the chamber wall and securely fastened to the top rung with fiberglass tape. Tracer joints is to be continuous with no jounts. Where joints are needed (between rolls) they are to be soldered together plus wrapped in dielectric tape over wrapped with vinyl tape.

.13 Hydrants and Valves - as per OPSD 1105.01. All hydrants are to be self-draining (unless in areas with high water table). All hydrants are to be equipped with one (1) four inch (4") pumper port. Hydrants are Canada Valve (CanVal) or other approved equipped with one (1) 100 mm pumper port with manufacturer's "Stortz" nozzle facing the street.

.14 All bends and tees must be OPSD 1103.01 and 1103.02 and blocked to undisturbed ground.

.15 All mechanical connections to be protected against corrosion through the use of corrosion protection duration nuts. Nuts to be used on 50% of all T-bolts per connection and are to be used in addition to standard fastening nuts, not in place of standard nuts.

.16 All mechanical connections to be protected against corrosion through the use of corrosion protection duration nuts. Nuts to be used on 50% of all T-bolts per connection and are to be used in addition to standard fastening nuts, not in place of standard nuts.

.17 All mechanical connections to be protected against corrosion through the use of corrosion protection duration nuts. Nuts to be used on 50% of all T-bolts per connection and are to be used in addition to standard fastening nuts, not in place of standard nuts.

.18 When watermain does not have sufficient cover the watermain must be insulated.

.19 Backfill Material shall be in accordance with Section 31 23 00 - Excavation, Backfilling, Grading. Backfilling from top of pipe cover to underside of granular subgrade in paved areas shall be as per Fill Type 2. Backfilling from top of pipe cover to underside of topsoil in landscaped areas shall be Fill Type 5.

.20 Valves:

.1 Gate valves to be iron body, bronze mounted, double-disc type, double faced and sealed, and non-rising stem, conforming to AWWA C509.

.2 Valve ends to be mechanical joint B AWWA C111/ANSI A21.11.

.3 Direction of opening-counter-clockwise unless otherwise specified.

.4 Operating nut B 50 mm unless otherwise specified.

.5 Valves to be supplied in accordance with Region's standards.

.21 Valve Boxes:

.1 To be either Mueller A769 with guide plate; or Clow-Bibby VB 1100/Rb645

.22 Fittings:

.1 Ductile iron fittings to conform to AWWA C110/ANSI A21.10 with 1724 kPa pressure rating. PVC fittings to conform to AWWA C900, C907, CSA B137.3.

.2 Joints to conform to AWWA with ductile iron pipe electrical conductivity must be provided.

.3 Where fittings are used with ductile iron pipe electrical conductivity must be provided.

.23 Concrete shall conform with MTO Form 904 except modified as follows:

.1 Unless otherwise specified, all concrete shall have a minimum compressive strength of 25 kPa @ 28 days.

.2 All concrete shall have a maximum slump of 75 mm.

.3 A 5% air-entraining admixture shall be employed in all exterior concrete exposed to freezing and thawing.

.4 Reinforcing steel shall conform to CSA G30.12 and G30.13 and shall be Grade 60 minimum.

.24 100mm perforated subdrains are to be installed where noted on the engineering drawings. The subdrains are to be wrapped in filter cloth. Refer to Section 33 46 00.

PART 3 - EXECUTION

3.1 EXCAVATION, TRENCHING AND BACKFILLING

.1 Protection of existing surface and sub-surface features shall comply with subsection 1.5 above.

.2 Stripping of topsoil shall be as outlined in specifications Section 31 10 00.

.3 Stockpile fill materials in areas designated by the prime Consultant. Protect fill materials from contamination. Remove all surplus fill off-site on completion of work.

3.2 DEWATERING

.1 Keep excavation free of water while work is in progress. Protect open excavations against flooding and damage due to surface run-off.

.2 Dispose of water in a manner not detrimental to public and/or private property, or any other portion of work completed or under construction.

.3 When necessary and if required, submit for consultant=s approval details of proposed dewatering methods, such as dikes or well points.

.4 The Contractor shall be responsible for all ground and surface water control.

3.3 EXCAVATION

.1 All excavation shall be in open cut and shall comply with the requirements of the Occupational Health and Safety Act.

.2 Should existing utilities be encountered during excavation, these utilities shall be adequately protected and/or supported by the Contractor to the satisfaction of the Consultant and/or the utility company having jurisdiction over the utility.

.3 Should in the opinion of the Consultant unsuitable subgrade material be encountered at the bottom of the trench, the Consultant shall direct the Contractor to further excavate the unsuitable material and backfill with approved material.

.4 The trench width and sewer bedding shall be constructed in accordance with the specification and/or as indicated on the Contract Drawings. Should the Contractor erroneously over-excavate the trench width, the Consultant may direct the Contractor to construct a higher class of bedding or install a stronger class of pipe, or both; at no additional expense to the Owner.

.5 Sheeting and shoring or trench box construction shall be carried out in accordance with the Occupational Health and Safety Act. The Contractor shall submit drawings to the Consultant for review prior to commencement of the sheeting and shoring. Removal of sheeting and shoring or the travel of the trench box shall be carried out such that disturbance of the pipe or bedding material does not occur. Sheeting ordered left in place by the Consultant shall be cut off at least 1 metre below finished grade.

.6 The sewer trenches shall only be excavated a maximum of 30 m in advance of the complete pipe laying unless authorized by the Consultant. The open portion of the trench at workday's end shall be secured off with the erection of snow fencing as directed by the Consultant.

.7 Trenches are to be backfilled and compacted to subgrade immediately following inspection of the underground service by the Consultant and the appropriate authorities. Trenches under floor slab must be backfilled with imported Granular B fill as specified in Section 31 23 00.

.8 All trenches shall be kept free and clear of water to the extent that any portion of the pipe shall not be laid in water. Disposal of the water shall be as per subsection 3.2, above. If directed by the Consultant, the Contractor shall construct sedimentation ponds to facilitate the removal of sand and silts from the trench water being disposed of.

3.4 GRANULAR BEDDING

Place bedding in unfrozen condition.

.1 Place granular bedding and cover material in uniform layers not exceeding 150mm compacted thickness. Minimum bedding thickness is 150mm, cover material to 300mm above top of pipe.

.2 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

.3 Shape transverse depressions as required to suit joints.

.4 Compact each layer full width of bed to at least 95% Standard Proctor Maximum Dry Density.

.5 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.

3.5 FIELD TESTING

.1 Leakage testing/deflection testing if required, shall be done in accordance with OPS Specification No. 410.

.2 Watermain piping shall be hydrostatically tested at 200 psi for two hours and in accordance with OPS Specifications No. 701.

.3 Video Inspections

.1 The Contractor shall carry out T.V. camera inspections of all sewers installed under this Contract. The camera can be either pulled of self-propelled through the pipes, the equipment is to have features to enable closer examination of faults and to view up lateral connections. The equipment is to provide Ameasured@ location of the camera relative to manholes in order to locate faults, laterals, etc.

.2 Two T.V. camera inspections are required; one at the start of the maintenance period and a second at assumption.

.3 Two copies of each video recording shall be made and delivered by the Contractor; one to the Site Services Consultant and one to the Owner, each accompanied by a written report with photographs of problem areas.

.4 Provide a DVD with sewer inspection reports and video inspections of each sewer line, for submission to Authorities Having Jurisdiction, as required for release of securities paid by the Owner.

3.6 WATERMAIN AND APPURTENANCES INSTALLATION

.1 Watermains shall be laid to the line and grade specified on the Contract Drawings. Deviation from this line and grade shall not be more than 75 mm. Watermain depth to top of pipe from finished grade shall be a minimum 1.8 metres unless otherwise specified on the Contract Drawings.

.2 Pipe Installation

.1 Pipe lengths shall be laid and jointed in accordance with the manufacturer's instruction and without damage to the pipes. Pipe joints may be deflected to provide for a long radius curve provided this is carried out to within the manufacturer's specifications.

.2 Mechanical joint nuts shall be tightened in alternating 180 degree positions with a torque wrench to the manufacturer's specifications.

.3 Valve Installation

.1 Valves shall be installed at the locations shown on the Contract Drawings with the stems vertical and plumb and in accordance with Municipality and Region's Standards

.2 All valves to open in a counter-clockwise direction.

.4 Valve Box Installation

.1 Valve boxes shall be installed at the locations shown on the Contract Drawings and shall be centred and plumb overtop the valve operating nut with the top set to finished grade level.

.5 Hydrant Installation

.1 Hydrants shall be installed at the locations shown on the Contract Drawings and in accordance with Municipality and Region's standards.

.2 Hydrants shall be connected to the main with a 150 mm ductile iron branch tee controlled by an independent gate valve. The hydrant shall be installed against undisturbed soil with concrete anchorage.

.3 The hydrant valve box shall be centered and plumb over the gate valve and set to its finished grade level.

.6 Thrust Anchorage

.1 All bends, fittings, tees, hydrants subject to movement due to pressure thrust shall be anchored with mechanical restrainers in accordance with municipal and regional standards.

.7 Connections to Existing Watermains

.1 Obtain permission from the operating authority before making any connections to an existing watermain.

.2 Valves on existing watermains shall not be operated by the Contractor unless approved by the consultant and the operating authority.

.3 All affected water users shall be notified in writing at least 48 hours in advance of any planned interruption of service.

.4 Swab fittings and pipes placed into the existing line with a solution of chlorine having a minimum strength of 50 ppm.

.5 Take precautions to prevent contamination of the existing system and follow all instruction of the operating authority.

.8 Plug and Blow-offs

.1 Temporary plug and blow-offs shall be constructed as required for the purposes of hydrostatic testing, and chlorination and flushing.

.9 Tracer Wire

.1 Tracer wire shall be taped to the watermains with fiberglass tape every 3m (Min.).

.10 Cathodic Protection

.1 Zinc anodes shall be affixed to all ferrous watermain fittings and tracer wire.

3.7 DISINFECTION OF PIPES AND INSERTED FITTINGS

.1 Responsibility

.1 Disinfection of water distribution system shall be the responsibility of the General Contractor.

.2 Disinfection

.1 Before new piping systems for potable water which can be completely filled and isolated are taken into service, observe following procedures:
- .1 Clean and flush to Engineer's approval.
- .2 Fill tanks or piping systems with potable water containing 50 mg/L residual chlorine, ensure even distribution and leave for 24 hours. If a residual of less then 25 mg/L remains at end of 24 hours period, repeat.
- .3 Drain chlorinated water and dispose of as specified below.
- .4 Flush system and fill with potable water.
- .5 Obtain one or more samples, as directed by Engineer, and submit for bacteriological testing.
- .6 When test results indicate that water is of acceptable quality, piping systems may be connected and taken into service.

.2 Before piping sections that cannot be isolated, or fittings to be inserted into existing pipe lines, are taken into service, observe following procedure:
- .1 Clean and flush to Engineer's approval.
- .2 Swab or wash all surfaces in contact with potable water with 250 mg/L residual chlorine solution.
- .3 Have all persons handling above equipment wear sterilized gloves.

.4 Complete insertion or connection under supervision of Engineer.

.3 Discharge of Chlorinated Water
.1 Chlorinated water used for disinfection is toxic to plants and wildlife and fish.
.2 Permissible disposal methods are:
.1 Discharge to storm sewer or stream only if concentration at edge of mixing zone is below 0.002 mg/L.
.2 Open drainage ditch, well separated from receiving stream. Presence of weeds, sunlight and high temperature is required. Monitor rate of discharge.
.3 If above disposal method conditions cannot be met, dechlorinate as follows:
.1 Use any of chemicals listed.
.2 Determine quantity required from:
"excess chlorine residual x Factor = dosage required".
.3 Hydrogen Peroxide (Factor = .479). Most recommended. Overdose will add more oxygen to stream.
.4 Sulphur Dioxide (Factor = .901). Will lower pH in receiving water.
.5 Sodium Thiosulphate (Factor = 2.225). Will cause harmless sulphur turbidity.
.6 Sodium Sulphate (Factor = 1.775). Excess will lower dissolved oxygen content in stream.
.7 Sodium Pyrosulphate (Sodium Metabisulphite) (Factor = 1.338). Excess will lower dissolved oxygen content.
.8 Example: 11,000 L of 21 mg/L to be discharged at 1.0 mg/L residual, using Hydrogen Peroxide. Dosage required 20 x 0.479 = 9.6 mg/L. Total amount needed 9.6 x 10-3 x 11,000 = 105.6 g of H202. For 35% commercial grade, total quantity required is 100/35 x 105.6 = 302 g.

3.8 INSTALLATION OF MANHOLES AND CATCHBASINS

.1 Manholes

.1 Manholes shall be installed at the locations shown on the Contract Drawings.

.2 Manholes shall be equipped with safety gratings as specified on the Contract Drawings.

.3 Each pipe entering a manhole shall be cut flush to the inside face of the manhole wall and be grouted into the manhole wall.

.4 Each pipe entering a manhole shall have a pipe joint within one metre of the outside wall of the manhole.

.5 Manhole benching is to be a minimum of 230 mm wide. Manhole chamber openings are to be located on the upstream side of the manhole.

.6 Manhole frames and grates not located in an asphalt area shall be set at finished grade.

.2 Catchbasins

.1 Catchbasins and leads shall be installed at the locations shown on the Contract Drawings.

.2 Catchbasin leads shall be cut flush with the inside face of the catchbasin wall and be grouted into the catchbasin wall.

.3 Catchbasin leads shall be bedded to undisturbed ground with compacted granular bedding.

.4 The top of the catchbasin concrete shall be set at the elevation of the pavement subgrade (if applicable). Unless otherwise specified, precast adjusting rings shall be utilized in adjusting the catchbasin frame and grate to the desired interim or final elevation.

3.9 FILL TYPES AND COMPACTION

.1 Backfill and compaction shall be in conformance with the requirements of Section 31 23 00, Excavation and Fill, and as indicated below.

.2 In areas where paving and walks occur, fill trench to subgrade with Type F2 fill, Granular B, Type 1, and compact in accordance with Section 31 23 00.

.3 In areas where paving and walks do not occur, fill trench to subgrade with selected material from on-site excavation or other sources.

.4 Compaction

.1 Compact bedding to minimum 98% Standard Proctor Density.
.2 Compact backfill where paving and walks occur to 100% Standard Proctor Maximum Dry Density in top 400mm below subbase/base materials and to minimum 98% Standard Proctor Density below that level. In other areas compact backfill to minimum 95% density.

3.10 BACKFILLING AND SEWER PIPE

.1 Backfill placed against pipes should be done so in a manner as not to permit any damage or movement.

.2 Backfill material shall be placed in 300mm lifts in a manner so as not to damage the pipe structures. These lifts shall be individually compacted as specified.

.3 No main line sewer or building connection laterals shall be backfilled until as-built elevations and locations have been taken.

.4 Any settlement that occurs after backfilling shall be repaired without compensation.

3.11 BACKFILLING AROUND CATCHBASINS AND MANHOLES

.1 Catchbasins and manholes shall be backfilled with Granular B, Type 1.

.2 Use a sand backfill in confined areas, where compaction is difficult.

3.12 **ABANDON MONITORING WELL**

.1 Work to be performed by person(s) licensed by the Ministry of the Environment for the installation and abandonment of water wells. Purging and chlorination of the well. Placement of plugging material from the bottom of the well upward to approximately 1.0m below ground surface. Material must be capable of creating a proper seal in various types of well construction and in different geological and hydrological conditions. Placement of at least 1.0m of bentonite chips or pellets. Preparation and submission of well abandonment records to the Ministry of the Environment and the Region.

3.13 **PROVISIONAL ITEMS**

.1 Do not proceed with any additional work unless written authorization is obtained from the Consultant.

3.14 **MEASUREMENT AND PAYMENT**

.1 This is a stipulated price contract. The stipulated price shall be compensation in full for the supply of all labour, materials, consumables and equipment necessary to carry out construction of the sewers, watermains, subdrains, and appurtenances including trench excavation, subgrade preparation, control of ground and surface water, bedding, pipe, fittings, valves, valve boxes, valve chambers, hydrant, blow-offs, trench excavation, connection(s) to existing main(s), protection of any existing utilities, construction and maintenance of all siltation controls, preparation of subgrade, bedding, thrust blocking, tracer wire, cathodic protection, backfilling, compaction, cleaning, flushing, testing, video inspection, chlorination, benching, precast adjusting rings safety grates, frames and grates and all other works necessary to install the site services as specified. Operation or testing of existing watermains performed by the Municipality or others.

.2 The depth of the excavation shall be sufficient to allow for the necessary depth of bedding below pipe. Any erroneous over-excavation by the Contractor shall be backfilled with acceptable bedding material at no additional expense to the Owner.

.3 Any additional sub-excavation ordered by the Consultant due to poor soil conditions encountered will be excavated and backfilled with additional granular backfill. Measurement shall be made on a per tonne basis.

.4 Rock excavation shall be measured on a cubic metre volume basis. The contract price tendered (as a contingency item) for rock excavation shall be compensation in full for the supply of all labour, materials, consumables or equipment necessary to carry out the rock excavation including disposal off site.

.5 For measurement purposes, a count shall be made of wells abandoned.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 Supply and install sub-drainage piping including services and fittings, trenching, bedding and backfilling as indicated on all drawings.

.2 Provide all sub-drainage indicated on drawings.

.3 Connect all subdrainage piping to catchbasins.

1.2 RELATED WORK

.1	Excavation and Fill	Section 31 23 00
.2	Asphalt Paving	Section 32 12 16
.3	Exterior Plants	Section 32 93 00

1.3 REFERENCES

.1	CBSB 41-GP-25M	Standard for: Pipe, Polyethylene, for the Transport of Liquids
.2	BNQ 3624-115	Polyethylene (PE) Pipe and Fittings - Flexible Pipes for Drainage - Characteristics and Test Methods
.3	OPSS 1840	Material Specification for Non-pressure Polyethylene (Pe) Plastic Pipe Products
.4	ASTM D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

1.4 PERMITS

.1 Contractor to obtain all necessary permits and approval certificates and pay all costs incurred with the installation of drains and basins and the connection to the storm sewer.

1.5 INSPECTION

.1 Arrange for inspection by the Inspection and Testing Company of completed installation before backfilling.

.2 All compaction to be verified by the geotechnical Inspection and Testing Company.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Subdrain Pipe:
- .1 Corrugated polyethylene pipe to BNQ 3624-115.
- .2 Minimum 150mm inside diameter; provide larger diameters where indicated on drawings.
- .3 Pipe shall be manufactured from high density polyethylene resin, to ASTM D3350 Cell Class 424420C.
- .4 non-perforated type for discharge lines

.5 perforated type for collector lines
.6 provide pipe with filter sock where indicated on drawings
.7 "Big O" by Armtec or equivalent acceptable to the Consultant.
.8 Provide fittings for connections; fittings shall be as recommended by pipe manufacturer.

.2 Filter Cloth: Terrafix 270R by Terrafix Erosion Control Products Inc., or approved equivalent.

.3 Filter Material: Clean crushed stone, 100% passing 11mm sieve, 100% retained on 6.5mm sieve conforming to CAN 3- A23.1.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install sub-drains where indicated on the drawings and as described below.
.1 at the perimeter building
.2 below curbs at the perimeter of paved areas.
.3 at perimeter of sodded or landscaped traffic islands
.4 at retaining wall
.5 at landscaped areas where indicated, for drainage

.2 Provide sub-drains at all catchbasins consisting of minimum 3000mm long sections extending in four directions, with inverts located minimum 750mm below the surface of the paving.

.3 Place minimum 200mm depth of granular filter material, placing appropriate width of filter cloth on the top.

.4 Lay perforated pipe directly on filter cloth and continuously wrap around entire length of pipe ensuring adequate laps at all filter cloth joints.

.5 Ensure pipe interior and coupling surfaces are clean before laying.

.6 Slope perforated pipes to drains at approximately 2% or as indicated.

.7 Non-perforated pipe to be laid with minimum 0.5% slope.

.8 Do not use concrete, masonry, stones, wood or any type of shim to establish pipe slope.

.9 Connect pipes using manufacturer's recommended fittings.

.10 Protect pipe ends from damage and ingress of foreign material at each end of each days work or work stoppage.

.11 Notify Consultant for review of pipe installation prior to covering with additional granular filter material.

.12 Install minimum 200mm filter material to sides and top of perforated pipe for perimeter drainage.
.13 Install minimum 200mm clean filter material cover on all sides of non-perforated pipe.

.14 Place filter material by hand in 200mm lifts. Consolidate by tamping lightly. Prevent displacement of pipe.

.15 Make watertight connections to catch basins and manholes. Use shrinkage compensating grout if suitable gaskets are not available.

.16 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes. Joint to be structurally sound and watertight.

3.2 **BACKFILL**

.1 Backfilling of trenches to be as specified in Section 31 23 00. Backfill only after installations have been inspected and approved by Owner and local Municipality.

.2 Place backfill material above pipe surround in uniform layers not exceeding 150mm compacted thickness up to grades as indicated. Under paving and walks compact backfill to at least 98% maximum, density to ASTM D698.

END OF SECTION