UXBRIDGE HOSPITAL FOUNDATION OFFICE
Section Architects Project # 22042

PROJECT SPECIFICATIONS BOOK
VOLUME 1
(Sections 00 00 00 - 14 00 00)

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VOLUME 1

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END OF SECTION

The abbreviations listed below are used to indicate the specifications for which licenced professional consultants are responsible. Refer to 'Section 00 01 10 – Table of Contents' for the assignment of the symbols to each specification. Drawings shall be issued under licence and name of each discipline. Where contract documents are produced by a Professional Engineer, signed professional stamps will be included. Refer to architectural drawings for contact info for each Consultant.

DISCIPLINE	ABBREVIATION	NAME
Acoustic Consultant	AC	
Architect	A	Section Architects, Toronto
Civil Engineer	C	
Commissioning Agent	CxA	
Construction Manager	CM	
Cost Consultant	CC	
Door Hardware Consultant	DH	
Electrical Engineer	E	Sharma & Partners Inc, Toronto
Elevator Consultant	EC	
FF&E Consultant	FF&E	
Food Services Consultant	FS	
Landscape Architect	L	
Land Surveyor	LS	
Lighting Consultant	LC	
Mechanical Engineer	M	Sharma & Partners Inc, Toronto
Planning Consultant	PL	
Process Engineer	P	
Security Consultant	SEC	
Specifications Consultant	SC	
Structural Engineer	S	
Water Feature Consultant	WF	

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Contract between Contractor and Subcontractor or Trade Contractor.

.2 Contract between Contractor and Supplier.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises general construction of:

Project Name: **4 Campbell Drive, Uxbridge ON L9P 1R5**

Description of Work:

Interior fit out of an office space at LVL1 of an existing 2-storey hospital building at 4 Campbell Drive in Uxbridge. Demolition Work includes removal and reinstallation of a portion of the existing ceiling in the corridor facing the suite where new work is proposed. New Work includes interior fit out of an office space.

1.3 DEFINITIONS

.1 Notwithstanding definitions specified elsewhere, the following definitions take precedence and govern specification divisions 01 through 33 inclusive of the Contract Documents. In the event of conflict, the following shall govern.

.1 Owner:

Uxbridge Cottage Hospital, Oak Valley Health
4 Campbell Drive
Uxbridge, ON L9P 1S4
Tel: (437) 778-9755

.2 Contractor: **As selected by the Owner's bid process.**

.3 Form of Contract between Owner and Contractor: CCDC-2, as may be amended by Supplementary Conditions.

.4 Consultant: the prime consultant is Section Architects Ltd., and the term 'Consultant' means them and all of their sub-consultants and specialists engaged by them for design-related work on the Project.

.5 Place of the Work: means the location of the Work identified in the Contract Documents.

.6 Product: means material, machinery, equipment, and fixtures forming the Work.

.7 Project: means the total construction contemplated of which the Work may be the whole or a part.

.8 Project Team: all the parties involved in the Project, including Owner, Consultant, Contractor, Subcontractors and Suppliers.

.9 Must: 'must' is used in the specifications to indicate a requirement that is contractually binding, meaning it is required to be implemented, and its implementation verified; it has the same contractual purpose as 'shall' in the specifications.

.10 Provide: means to supply and install. The word 'provide', whether capitalized or not, is a term meaning 'supply and install' when found used anywhere in the Specifications or Drawings.

.11 Trade, Trade Contractor, Subcontractor: means person or entity having direct contract with Contractor to perform a part or parts of the Work at the Place of the Work.

.12 Shall: ‘shall’ is used in the specifications to indicate a requirement that is contractually binding, meaning it is required to be implemented, and its implementation verified.

.13 Should: ‘should’ is used in the specifications to indicate a goal that must be addressed by the Contractor but is not formally verified. The Contractor is required to communicate to the Consultant at progress meetings how they are intending to achieve the goal and what progress they have made.

.14 Supplier: means person or entity having direct contract with Contractor, Trade, Subcontractor, or to supply Products.

.15 Will: ‘will’ is used in the specifications to indicate a statement of fact.

.16 Work: means the total construction or a part or parts thereof and related services required by the Contract Documents.

.17 Other DEFINITIONS as specified in Contract referenced in 1.1 REFERENCES of this Section.

1.4 COORDINATION

.1 Refer to Section 01 31 13 - Project Coordination for further requirements.

.1 Subcontractors, Trade Contractors, and Suppliers shall cooperate with each other in carrying out their respective works as required to maintain Construction Schedule and eliminate inefficiencies, and carry out instructions of Contractor and Consultant.

.2 Subcontractors, Trade Contractors, and Suppliers shall coordinate work with that of other Subcontractors, Trade Contractors, and Suppliers as required to maintain Construction Schedule and eliminate inefficiencies. If any part of the Work subcontracted depends for its proper execution or result upon Work of another subcontract, report promptly in writing any constraints that may interfere with proper and timely execution of the Work contracted to Contractor and Consultant.

.3 Coordination and cooperation between Subcontractors, Trade Contractors, and Suppliers is required.

.4 Coordinate use of worksite and property under direction of Contractor and Consultant.

.5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.5 DEFINED TERMS

.1 The parties to the Contract agree that a term found defined in DEFINITIONS of the Contract Documents and used in the Specifications, whether appearing in regular font or in italics or capitalized or not, shall have the meaning of that defined term.

1.6 COMMISSIONING

.1 Comply with commissioning requirements per Section 01 91 10 - Commissioning, and referenced Certificate of Readiness.

.2 Refer to Section 01 91 00 - Building Enclosure Performance Requirements for air barrier commissioning and testing requirements. Test air tightness of assemblies prior to covering the air barrier materials by other construction to permit corrective measures to be applied and re-tested prior to proceeding with other Work. Make time in the construction schedule to properly test the air tightness of assemblies and for corrective measures to be applied to seal any air leakage pathways.

.3 Cooperate with commissioning processes, and schedule and sequence the Work as required to accommodate commissioning activities in compliance with the Project Schedule.

.4 Contractor shall perform integrated systems commissioning of interconnected systems:

.1 Perform Integrated Systems Tests to confirm that Systems and Subsystems perform and function in concert according to the design intent and requirements of the Contract Documents.

.2 Commission Fire Protection Systems: commission fire alarm system and interaction with other systems such as elevators, pull stations, doors, smoke detectors, heat detectors, combination smoke and heat detectors, and electronically supervised sprinkler system, as required to ensure the proper operation and functional interactions between systems in accordance with ULC S1001-11, Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems.

.3 Make available the original equipment manufacturer's trained certified representatives familiar with the Systems, combination of Systems, or Subsystems being Commissioned to demonstrate their operation in their entirety, including all control sequences. Owner reserves the right to request additional representation, at no cost to Owner. Consultant and Owner reserve the right to request ad hoc testing beyond the Commissioning procedures, the need for which may become evident during Commissioning.

1.7 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:

.1 Master Schedule.
.2 Detailed Schedule.
.3 Work Breakdown Structure (WBS).
.4 Two-week Look-ahead Schedule.
.5 Preconstruction Mock-Up Lessons Learned – Summary of Findings.
.6 Drawings.
.7 Specifications.
.8 Addenda.
.9 Quality Plan, and record of corrective and preventative actions taken to address non-conforming Work.
.10 Reviewed Shop Drawings.
.11 List of Outstanding Shop Drawings.
.12 Change Directives.
.13 Change Orders.
.14 Other Modifications to Contract.
.15 Field Test Reports.
.16 Test certificates.
.17 Warrantees.
.18 Test and mix designs.
.19 Health and Safety Plan and Other Safety Related Documents.
.20 Workplace Hazardous Materials Information System (WHMIS) sheets.
.21 Electrical and mechanical interferences / coordination drawings.
.22 Other documents as specified in the technical sections, including data sheets, installation instructions, standard details, guide specifications, handling, storage and environmental requirements.

END OF SECTION

1.1 DESCRIPTION OF MISCELLANEOUS GENERAL WORK

.1 Work will be performed under one Contract. The Contract will be in the form of the Agreement between Owner and Contractor, Canadian Standard Construction Document, CCDC 2 - 2020, Stipulated Price Contract.

1.2 GENERAL CONDITIONS

.1 The General Conditions of the Standard Construction Document, CCDC 2 - 2020 Stipulated Price Contract, and all Addenda as issued, and otherwise as defined in Definitions of CCDC 2, 2020, will govern the Work specified in each section of the Specifications.

1.3 DUST FREE ENVIRONMENT

.1 It is imperative that operational areas remain clean and dust free. It will be the Contractor's responsibility to ensure this. If the Contractor fails to maintain these conditions the services of a professional maintenance company will be retained to fine clean the areas in question and have the maintenance company invoice the Contractor directly.

.2 Be responsible to keep operational areas clean and dust free. Prevent contamination of and nuisance to adjacent areas and properties near the Work from dust by taking appropriate dust control measures. Take measures to prevent dust and dirt rising and migrating to occupied areas including return air systems and/or adjacent properties. Respond immediately to complaints of dust received from the public, authorities, and the Owner.

.3 Adjacent work areas remaining in use during construction period will have furnishings, and equipment covered under this Contract, completely prior to commencement of each of the Contractor's working periods and shall be removed thereafter. If required, the Contractor shall also provide additional dust covers and keep them in clean and usable conditions.

.4 Before the Work proceeds, the Contractor shall provide temporary dust-proof partitions and screens constructed as described in Section 01 56 00 and sealed at floor, walls, ceilings, or intersecting members in a manner to prevent dust and dirt infiltration into adjacent areas of the building.

.5 Contractor shall leave work area remaining in use clean and ready for use between each work period.

1.4 ALTERATIONS, CUTTING, PATCHING AND MAKING GOOD

.1 Conform to the Policies and Procedures for Contractors and shut down protocol where applicable.

.2 Provide Products, materials, construction, and workmanship and finish compatible matching existing in every respect unless indicated otherwise. Ensure new materials used to alter; repair damage work, patching and making good are compatible with existing components and materials.

.3 Set up and maintain permanent reference points and provide general dimensions and elevations for all work from time to time as required by individual trades, and be fully

responsible for accuracy of such reference points. All trades shall be notified that lines and levels are to be obtained from Contractor for proper coordination.

.4 Do not endanger the existing building, the Work or property by cutting, digging, or similar activities. No Section shall cut or alter the work of another Section unless such cutting or alteration is approved by the latter Section, the Owner and the Consultant.

.5 Perform work in a manner such as to cause a minimum of noise and interference to use of existing premises and services. Provide maximum safety for occupants during work.

.6 Fit construction tightly to ducts, pipes and conduits to stop air movement completely. The Section performing work that penetrates fire, air, vapour, moisture, thermal or acoustic separations of the building shall pack voids tightly with mineral fibre fire stop material as may be required, seal the air, vapour and moisture barriers and caulk joints as may be required to ensure that no air movement through the penetration is possible.

.7 Cutting, drilling and sleeving of the Work shall be done only by the Section who has installed it. The Section requiring drilling and sleeving shall inform the Section performing the work of the location and other requirements for drilling and sleeving.

.8 Throughout the entire construction period, provide proper and safe means of fire exit from all zones of existing building at all times, to approval of authorities having jurisdiction.

.9 Wherever it becomes necessary to cut or interfere in any manner with existing apparatus for short periods of time, do work at such times as agreed upon with the Owner.

.10 If required in critical locations prepare interference and/or installation drawings showing work of various trades as well as existing installations. Submit to Owner and/or authorities having jurisdiction for written permission before commencement of Work.

.11 If unscheduled disturbance to use of existing premises and services is required to complete work, inform the Owner with advance notice of seven (7) days minimum. Provide information of requirements and perform work at times directed by the Owner.

.12 Make provisions to join new work to existing and to install new supporting members, anchors and other items necessary for completion of work. Provide temporary bracing where required.

.13 Proceed with demolition of or alterations to any portion of existing building only after approval of the Owner has been obtained, and after weather tight, dustproof and soundproof screens have been erected to provide thorough protection to adjoining areas and rooms.

.14 When permission has been granted to proceed with alterations in existing building, carry out work expeditiously and continuously to completion.

.15 Carry out the Work so as to minimize dust migration and sound transmission. Protect items sensitive to and which could be damaged by dust. Where practical, keep demolition areas wetted.

.16 During performance of the Work, adequately protect the Work completed and in progress, and existing work to remain, such as floors, finishes, trim, and similar components, as completely as

.17 possible to minimize replacement of damaged work by each Subcontractor and trade. Work damaged or defaced due to failure to provide adequate protection shall be repaired, or removed and replaced as directed by the Owner.

.18 Properly coordinate work of various trades. Take into consideration existing installations to assure best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment and items, in available space. Under no circumstances will any extra payment be allowed due to failure by Contractor to coordinate work.

.19 For critical locations, consult with the Owner and prepare interference and installation drawings showing work of various trades as well as existing installations for review before commencing work in such locations. Coordinate with mechanical and electrical trades.

.20 Remove, store and reinstall existing fixed equipment, fixtures and components which interfere with construction work.

.21 Provide cutting and patching required for access to execute service alterations. Conceal capped services unless specifically indicated to remain exposed. Patch to conceal altered and capped services. Cutting, patching and making good of existing work to accommodate new work and requirements specified under other Sections shall be done in conjunction with work specified herein. Coordinate such work.

.22 Prior to cutting and drilling through structural and load bearing members, (e.g. Slabs, columns, beams and shear walls), obtain the Owner review and written acceptance of cut location and layout.

.23 Provide cutting such as core drilling of existing concrete and masonry walls and slabs to accommodate services through existing assemblies to accommodate alterations. Contractor shall obtain radiography (X-ray) imaging and/or high frequency, electro-magnetic penetrating radar imaging as may be required.

.24 Prior to performing radiography (x-ray) imaging for core drilling, Contractor shall ensure that the the Owner radiography (x-ray) imaging safety procedures are considered and discussed with all construction personnel, the Owner staff and students so that they are aware of the radiography (x-ray) imaging safety procedures involved. the Owner radiography (x-ray) imaging safety procedures shall include, but shall not be limited to the following:

.25 Contractor MUST obtain a Radiography Source Permit from the the Owner Radiation Protection Office ten (10) days (minimum of seventy-two (72) hours may be possible under certain circumstances) prior to performing x-ray imaging procedures. Under NO circumstances shall x-ray imaging procedures be performed by the Contractor without prior written notification and approval from the Owner. Contractor shall post the Radiography Source Permit in a conspicuous location outside the space where the x-ray imaging procedures shall be performed. An 80' - 0" (24.40m) radius MUST be established around each x-ray imaging site, and ALL x-rays will be done after regular operating hours. For the health and safety of the building occupants NO one is allowed in the building during x-ray imaging time periods.

.26 Where site conditions do not make it feasible to perform x-ray imaging, Contractor MUST exercise reasonable judgment to evaluate whether there is a chance that coring will cause the severing of electrical, low voltage or ANY other service that may be in the structure that is being penetrated. Use of hammer chisels may be necessary in some buildings. A thorough inspection of both sides of the surfaces MUST be performed by the Contractor. Contractor shall use a flux scanner to check for live load alternating current (AC). Where applicable, the opening of drop ceilings on the underside of the floors MUST be done to expose the breakthrough area. Small diameter pilot holes MUST be drilled prior to final coring or chiselling.

.27 A qualified electrician with access to circuit scanner must be present during coring or chiselling procedures should ANY services be severed. the Owner Campus Police ((416) 978 - 3000) and the the Owner's Project Manager must be contacted immediately on such occurrence. Depending on the circumstances, Contractor may be asked to begin restoration procedures of the severed services immediately. Any penetration of structural beams, columns or supports must be cleared by the Owner's Project Manager before proceeding. Patching and making good of coring or chiselling shall be the responsibility of the Contractor.

.28 Where applicable, and where acceptable to the Owner's Project Manager, Contractor MAY alternatively use high frequency, electro-magnetic penetrating radar imaging. Procedures for high frequency, electro-magnetic penetrating radar imaging shall be similar to the x-ray imaging procedures. The Owner's Project Manager shall clarify the requirements of electro- magnetic penetrating radar imaging procedures with the Contractor where necessary.

.29 Contractor shall employ tradesmen qualified in work being cut and patched to perform work correctly and skillfully.

.30 Do not undermine, damage, or endanger existing structure and structural components, pipe lines, electrical conduit and wiring by digging, cutting or any other operation in performance of Work of this Contract. Immediately repair and make good existing work so affected, including working after regular working hours, to the Owner approval, recommendation and satisfaction at no additional cost to the Owner.

.31 Except where structural requirements are indicated on Drawings, do not cut, drill or sleeve load bearing members without first obtaining the Owner written authorization for each condition.

.32 Cutting and patching for holes required by Mechanical and Electrical work shall be as follows:

.33 Include under the work of Divisions 21 and 26 for cutting or provision of holes up to and including 50 square inches (32258 mm2) and related patching, except as indicated otherwise.

.34 Include under the Contractor's work, holes and other openings larger than 50 square inches (32258 mm2), and chases, bulkheads, furring and required patching. Contractor shall be responsible for determination of work required for holes in excess of 50 square inches (32258 mm2).

.35 Contractor shall be responsible for all cutting and patching in addition to that specified for mechanical and electrical work, and shall directly supervise performance of cutting and patching by other Sections.

.36 Perform drilling of existing work carefully, leaving a clean hole no larger than required.

.37 Make cuts clean and true with smooth edges. Fit units to tolerances established by existing work and in conformance with best standard practice for applicable class of work.

.38 Cut off, cap, divert or remove existing services in areas being altered which are affected by changes as required or as directed by municipal authorities and utility company concerned, and the Owner. Protect and maintain active services to existing building.

.39 Where new work connects with existing and where existing work is altered, perform necessary cutting and fitting required to make satisfactory connections with existing work under this Contract, so as to leave entire work in a finished condition. Match new Work

exactly with existing work in material, form, construction and finish unless otherwise noted or specified. Make joining work inconspicuous.

.40 Make good materials, surfaces, and finishes damaged or disturbed due to the Work of this Contract.

.41 The term "making good" shall mean repairing or filling operations performed on existing floors, walls, ceilings or any other exposed surfaces. Making good also means repairing, restoring, refurbishing, rehabilitating, or performing filling operation on any existing components disturbed due to work of this Contract, to at least the condition existing at the commencement of the Work, in terms of construction integrity, finishes, alignment with existing adjoining surfaces, compatibility of materials, sound attenuation criteria, exfiltration/infiltration requirements, air/vapour barrier and thermal continuity. It is intended that finished surfaces match existing in every respect, compatible and line with existing adjoining surfaces.

.42 Fill unused and unfilled sleeves and holes in non-fire rated floors and partitions not otherwise filled, by approved means. If unused sleeve is in fire or sound barrier, fill in manner to restore or maintain fire or sound barrier rating. Filling of openings in fire rated floors and partitions as specified herein.

.43 If non-designated and unclassified sprayed fire resisting, sound absorbing, or insulation applications are encountered, inform the Owner for examination and instructions. Restore damaged, non- asbestos type fireproofing to original condition before covering with finishes.

.44 Work shown on Drawings, Schedules and Specifications may or may not be all work required to be done in existing building. Make good and perform all necessary Work including incidentals to make a complete job of alterations work.

.45 Provide alterations indicated on and implied by the Contract Documents.

.46 Demolish existing, obsolete construction as part of alterations and prepare areas to receive new work.

.47 Refer to mechanical and electrical Specifications and Drawings for removal, capping, and alterations to mechanical and electrical work, e.g., conduit, wiring, fixtures, ducts, piping and other service lines.

.48 Protect active services which are intended to remain and which pass through spaces involved in alterations and repairs.

.49 Conceal piping, duct, conduit and other service alterations in ceilings, walls and furred spaces if possible.

.50 Repair adjacent construction and surfaces which are damaged or disturbed as a result of alterations.

.51 Disconnection and sealing off electrical services to area being demolished: Division 26, Electrical.

.52 Disconnection and sealing off steam heating and hot water to area being demolished: Division 22 and 23, Mechanical.

1.5 SELF-LEVELING TOPPING

.1 Bonding Slurry: Acceptable Manufacturers and Products: Surfacrete Concentrate by Sika Canada.

.2 Self-leveling Topping: Maxxon Canada Level Right-FS 10, Level Right-Plus, Level-Right or Commercial Topping in accordance with manufacturer's recommendations. Level-Right FS 10: 0 - 9 mm (0" - 3/8") thickness; up to 7000 psi, thin topping self-leveling floor underlayment for topping concrete or precast. Proper surface preparation shall be provided for shot blasting or epoxy primers; remove tile glue and adhesive or other exterior foreign material. Other acceptable Manufacturers and Products: Floor Leveler C26 UL by Target Products Ltd..

1.6 REMOVAL OF EXISTING FLOORING

.1 Remove existing flooring and adhesive/setting bed materials completely, down to concrete substrate.

.2 Shot blast existing concrete or prepare existing surfaces by other means acceptable to the Owner, and which are compatible with subsequent applied underlayment or applied finish Grind existing terrazzo floor as required, clean surfaces, and remove adhesives. Remove ridges and trowel marks and scrape substrate to a smooth level surface. Surfaces shall be smooth, clean, and free of gouges, matter detrimental to bond of underlayment and flooring and shall be ready to receive underlayment and flooring.

.3 New control joints in the finished flooring shall be in the same location as the control joints in the sub- floor.

.4 Provide skim coats, primers and bonding agent slurries to neutralize residue adhesives and setting beds and to provide a suitable substrate to receive scheduled floorings. Fill new and existing depressions, dished areas, low spots, voids, gaps, cracks, joints, holes and other substrate defects with skim coat and self-leveling topping to achieve a flat substrate to within following tolerances: 3 mm (1/8") total maximum deviation + and - along a 3000 mm (10') straight edge applied omni-directionally over entire floor area.

.5 Underlayment shall have compressive strength of 4100 psi after 28 days and tolerance of 3 mm (1/8") in 10'-0" measured with straightedge in any direction.

.6 Coordinate with substrate preparation specified in floor finishes Sections.

1.7 REMOVAL OF EXISTING CEILING TILES

.1 Removals of existing ceiling lay-in tile panels and retain existing hangers and provide additional if required to accommodate new ceiling lay-in tile panels to meet design requirements.

.2 Ensure that existing suspension systems are adequately secure to allow installation of new ceiling lay in tile system.

.3 Coordinate with electrical and mechanical trades to assess complete scope of new work to allow for their work such as feeder runs and similar work by mechanical and electrical trades.

.4 Coordinate with Division 22 Plumbing, Division 23 HVAC, and Division 25 Integrated Automation for mechanical components.

1.8 REPAIR TO EXISTING WORK

.1 Make good existing materials, and prepare the surfaces and refinish all finished surfaces damaged, marred, replaced, or otherwise remedied in the existing building(s).

.2 Term "make good" shall mean repairing, restoring, refurbishing, rehabilitating, or performing filling operation on any existing components such as existing floors, walls,

ceiling or any other exposed surfaces disturbed due to work of this Contract, to at least condition existing at commencement of the Work, in terms of construction integrity, finishes, alignment with existing adjoining surfaces, compatibility of materials, sound attenuation criteria, exfiltration/infiltration requirements, air/vapour barrier and thermal continuity repairing or filling operations performed on It is intended that finished surfaces match and line with existing adjoining surfaces.

.3 Where existing openings are indicated as filled-in, blocked in or new openings cut into walls, existing items removed or any form of alteration to existing surface or material is made, term "make good" shall be deemed to apply whether specifically noted or not.

.4 The Work shown on the Drawings, Schedules and Specifications may or may not be all the work required to be done in the existing building. Make good and perform all necessary work including incidentals to make a complete job of the alterations Work.

.5 Repair existing damaged work matching existing components in every respect. Replace existing damaged work with new materials matching in shape, size, colour and workmanship.

.6 Finish the new surfaces flush with existing surfaces. Make junctions between the existing and new work, or at replaced or remedial work visually undetectable. Make surfaces adjacent to one another of the same material, unit sizes, colour, and texture. If this is impossible, make a proposal of intended method of "making good" for acceptance of the the Owner Project Manager and Consultant prior to installation.

.7 Tooth new masonry work into existing masonry when installed in the existing building(s).

.8 Repoint defective joints as follows:

.1 Cut back joints 13 mm (2") taking care not to damage units. Remove dust and loose materials by brushing or by water jet. If water jet is used, allow excess water to drain before repointing.

.2 Repoint with same mix and colour as original.

.3 Pack mortar tightly in thin layers, and tool joint to match non defective joints.

1.9 REPAIRS TO EXISTING ROOFING

.1 Install new roofing system where existing roofing has been removed or damaged due to work of this Contract. Cut openings in existing roof system (except deck) required for work. Protect and seal adjacent roofing from water and damage due to elements. Make Good roofing system to match existing as promptly as possible.

.2 At the junction of new roofing with existing, remove existing flashing, fascia and cant.

.3 Remove gravel for distance of 900 mm (36") beyond junction between new and existing membrane.

.4 Trim edges of existing roofing to even, straight line.

.5 In event of unexpected discovery of damaged and/or wet insulation in area of work, immediately notify the Owner and Consultant team. The Consultant may authorize remedial Work, if any, in writing. Once a Change Order or Change Directive has been issued, complete remedial work as described.

.6 Remove debris and waste material, clean deck and provide new vapour barrier, insulation, tapered insulation and roof membrane at disturbed area.

.7 Install roofing system matching existing in every respect, lapping onto existing membrane 400mm (16"). Ensure watertight junction between existing and new roofing.

.8 Make junctures at new equipment and altered or added vertical surfaces using elastic flashing or modified bituminous flashing as specified, required or indicated.

.9 Provide poured topcoat to seal area of alteration and cover with aggregate as required.

.10 Replace or repair metal flashings to match existing. Colours to be approved by Consultant prior to fabrication or installation.

1.10 RELOCATED COMPONENTS

.1 Disconnect services on items for relocation forms part of the work of Electrical and Mechanical Divisions.

.2 Disconnect fastening and anchorage of items to be relocated. Patch abandoned fastening and anchorage holes to match with and flush with adjacent surfaces.

.3 Carefully relocate items indicated and repair any damage received as a result of relocation in accordance with the Owner directions.

.4 Relocate existing washroom accessories and other components noted on Drawings complete anchoring to floors to match existing in new location.

.5 Refer to Mechanical and Electrical Drawings for relocation of mechanical and electrical components.

1.11 ASBESTOS REMOVAL

.1 Removal of asbestos containing / contaminated materials will be performed by appropriately qualified Contractors in accordance with Hazardous Material Report including conforming to Ministry of Labour lead regulation and asbestos removal and waste disposal requirements.

.2 In the event of unexpected discovery of suspect asbestos-containing materials; notify the Owner for proper directions and removal of asbestos by others prior to work starting in these areas of this Contract.

.3 Comply with Ontario Regulation 278/05 made under the Occupational Health and Safety Act and entitled Designated Substance - Asbestos on Construction Projects and in Building Repair Operations. Conform to the Owner’s Asbestos Management Program and follow the Owner Asbestos Abatement Procedures as outlined in Specifications. In any case of conflict with these Specifications, more stringent requirements shall apply.

END OF SECTION

1.01 BUILDING OPERATOR COORDINATION

.1 Section 01 31 19 – Project Meetings: The building manager (building operator) and identified personnel shall be included in Contractor's construction start-up meeting and subsequent biweekly construction meetings. The building manager shall be included in the circulation of meeting minutes.

.2 Section 01 35 29 – Health and Safety Requirements: the building operator's health and safety personnel shall be invited to Contractor's health and safety start-up meeting before construction is started and throughout the project. building operator's health and safety personnel shall be included in the circulation of meeting minutes.

.3 Section 01 91 10 – Commissioning: coordinate commissioning with the Building Manager.
- .1 Develop Commissioning issues log forms, which shall be used throughout the project construction, acceptance and close-out, and submit to Consultant and Building Manager along with other required commissioning forms for review.
- .2 Maintain and submit commissioning forms as required, including but not limited to pre-functional checklists, start-up checklists, functional performance testing procedures and reports, integrated systems testing procedures and reports.
- .3 Include forms and reports in O&M manual.

1.02 ACCESS AND EGRESS

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

1.03 DUST BARRIERS

.1 Where the project involves partial occupancy throughout construction, along with the periodic relocation of occupants to accommodate shifting work areas and phases, the contractor shall prepare a phasing diagram based on the scope of work described in the Contract Documents, to be reviewed and approved by the Owner.

.2 Temporary dust barriers (fire-rated where indicated in accordance with Section 07 84 00 requirements and authorities having jurisdiction) shall be constructed at work area perimeters as required to prevent migration of dust, odours and noise beyond work areas.

.3 All temporary dust barriers shall confine dust and noise to within work areas. Temporary seals shall be used at hoarding perimeters, and penetrations if any, to prevent movement of air and sound. Partitions shall be insulated, and where a fire rating is required, they shall consist of materials meeting fire-rating requirements. Prime and finish paint partitions at exposed face to colour selected by Consultant.

.4 Finish exposed face of hoarding to Level 3 finish, prime and finish paint (eggshell sheen), colour as directed by Consultant.
- .1 Refer to Section 09 21 16 – Gypsum Board Assemblies and Section 09 91 00 – Interior Painting.
- .2 Refer to Section 01 56 00 – Temporary Barriers and Enclosures.

1.04 NEGATIVE AIR PRESSURE REQUIREMENTS – WORK AREAS

.1 Where the work area includes only a portion of the floor plate, with remaining areas occupied, provide negative air pressure relative to occupied space air pressure, using temporary fans and ductwork as required, exhausted to the exterior.

.2 The negative pressure differential with respect to adjacent occupied areas shall be required to ensure that contaminated air (dust, fumes, etc.) cannot escape from the negative pressure areas (work areas) to other parts of the facility (occupied areas).

1.05 SPECIAL REQUIREMENTS

.1 Where applicable, the Project shall be organized and scheduled in Phases to be reviewed by and coordinated with the Owner and Consultant. The Contractor shall prioritize the safety and security of building occupants while Work is ongoing.

.2 Where Work is required in occupied floor spaces, the Contractor shall give a minimum of 48 hours notice to the Owner prior to commencing work. Where work in occupied floor spaces will create dust or debris, the Contractor shall maintain a clean and orderly site as well as provide required protection for existing finishes, furnishings, and equipment to remain.

.3 At occupied floors, paint and carpet occupied areas from 18:00 hours to 07:00 hours only unless otherwise approved by Building Manager and Consultant. During times when floor is unoccupied, Work times at Contractor’s discretion in conformance with Employment Standards Act and Regulations of Ontario, including errata and amendments.

.4 At occupied floors, carry out noise-generating Work from 18:00 hours to 07:00 hours only unless otherwise approved by Building Manager, Owner, and Consultant. At unoccupied floors, Work times shall be at Contractor’s discretion in conformance with Employment Standards Act and Regulations of Ontario. Any significant noise generating work at floors, such as scarifying (if required) or similar, shall be executed from 18:00 hours to 07:00 hours only unless otherwise approved.

.5 The sound attenuation ASTC rating between occupied spaces and construction work areas shall be ASTC 45 or better.

- .1 Pre-construction noise levels in occupied spaces that will be impacted by construction noise will be tested by a certified independent 3rd party testing agency, to “ASTM E336-16, Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings”.
- .2 The resultant apparent sound transmission class (ASTC) will be determined at three different times of day on three different days during the normal work week, with the days and times of day selected undisclosed but recorded for internal purposes by the testing agency.
- .3 Once construction has commenced, and dust/sound partitions built and in place, noise levels will again be measured in affected occupied spaces by the same agency, using the same testing protocols, at the same three different days and times of day used for pre-construction testing. The results will be compared, with a report furnished to the Contractor and Consultant.
- .4 If construction-phase ASTC levels average above ASTC 45, the Contractor shall develop a sound management strategy to reduce sound transmission so that field tests are within acceptable limits.
- .5 Should pre-construction testing find that average ASTC levels are less than ASTC 45, then the Contractor shall ensure that sound transmissions levels do not degrade more than 5 ASTC points from pre-construction levels.

.6 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart.

.7 Ensure Contractor's personnel employed on site become familiar with and obey regulations, including safety, fire, traffic and security regulations.

.8 Keep within limits of Work and avenues of ingress and egress.

.9 Ingress and egress of Contractor vehicles at site is limited to existing roadways.

.10 At occupied floors, deliver materials from 6pm to 7am only unless otherwise approved by the Consultant. At unoccupied floors, Work times at Contractor’s discretion in conformance with Labour Standards Act and Regulations of Ontario.

.11 Coordinate Work with demolition, construction, relocation, occupancy and delivery schedules in accordance with Section 01 31 13 – Project Coordination.

1.06 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security at pre-Contract levels.

.2 Contractor shall have an identification system in place to ensure that workers and personnel at site are properly identified and are permitted by the Contractor on site. The identification shall be sufficiently clear, with the individual’s name clearly visible, to permit easy identification by Building Manager and Consultant.

.3 Contractor’s personnel shall sign in and sign out as they come and go from the building. Everyone shall be issued a ‘Visitor’s Tag’ as they enter the building, which shall be returned when leaving the building. One designated individual from each trade will have use of an access card for the duration of Work. Contractor shall be issued 1 access card for the duration of Work. Access cards shall be signed in and out daily.

1.07 PRE-CONSTRUCTION SURVEY

.1 Show any pre-existing conditions of building exteriors, interiors and adjoining construction, including finishes, that might be misconstrued as damage caused by Contractor's operations.

- .1 Submit electronic copies of colour digital photography in Tagged Image File Format 6.0 (TIFF 6.0), fine resolution, prior to commencement of demolition activities and at completion of demolition activities. Images shall be sharp, clear, in focus, adequately lit, and of good quality.
- .2 Project identification: include name and number of project and date of exposure indicated.
- .3 Provide sufficient viewpoints and images to clearly view existing conditions; use same number of images and same viewpoints in pre-demolition and post-demolition photography.

.2 Coordinate with Section 01 33 00 – Submittal Procedures: item 1.05 PHOTOGRAPHIC DOCUMENTATION.

END OF SECTION

1.1 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

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

.3 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed the amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.6 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.7 Prepare a schedule jointly with Consultant and Contractor to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.

.8 Amount of each allowance, for Work specified in respective specification Sections is as follows:

.1 **Building Access and Automation System Integration: $10,000**

.2 **Unforeseen: $10,000**

.3 **Building Signage**: Include an allowance of **$10,000.00** excluding exterior traffic signage and signage required by the Ontario Building Code and regional authorities which is part of Project and included in Contract Price.

END OF SECTION

1.1 SUMMARY

.1 Coordinate between mechanical and electrical work, and work of other affected Sections in accordance with the requirements of this Section and other RELATED REQUIREMENTS.

1.2 RELATED REQUIREMENTS

.1 Section 01 11 00 - Summary of Work.

.1 Commissioning Plan.

.2 General Commissioning Requirements.

.3 General Training Requirements.

.2 Section 02 07 50 - Cutting and Patching.

.3 Division 03: Concrete Forming - Placement of cut outs and sleeves.

.4 Section 07 84 00 - Fire Stopping and Smoke Seals.

.5 Section 08 81 00 - Access Panels.

.6 Section 09 21 16 - Gypsum Board Assemblies.

.7 Section 09 51 13 - Acoustical Panel Ceilings.

.8 Divisions 21, 22 and 23 - Common Work Results: Common work results for fire suppression, plumbing, and heating, ventilating and air conditioning systems

.9 Division 25 – Common Work Results: Common work results for integrated -automation.

.10 Divisions 26, 27 and 28 - Common Work Results: Common work results for electrical, communications, and electronic safety and security.

.11 Section 26 50 00 - Lighting: Coordination of lighting installation with other mechanical and electrical systems.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Provide fully coordinated interference drawings prior to installation of ductwork as well as one 'interference meeting' 10 days prior to commencing ductwork to review findings and make minor adjustments as required. Contractor shall invite affected major trades and Consultant to the ‘interference meeting’, and shall also be in attendance and take minutes of meeting. Meeting record shall be circulated within 5 working days following the meeting to all attendees.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide required coordination documents before submitting shop drawings, product data and samples; provide information required by this Section in accordance with Section 01 33 00.

.2 Preparation of Mechanical and Electrical Coordination Drawings specified in this Section form a part of the Contractor’s Submission requirements:

.1 Mechanical contractor shall be lead coordinator for coordination drawings and the electrical contractor shall provide full cooperation.

.2 Mechanical and Electrical Subcontractors shall allow for full assistance and cooperation with each other as required in the provision of all required information for the assembly of Coordination Drawings.

.3 Mechanical and Electrical Coordination Drawings described in this Section form a part of Contract.

.3 Submit field coordination drawings for mechanical and electrical work above ceilings for all floor levels, including penthouse and mechanical and electrical rooms, supplemented with building cross sections indicating mechanical and electrical systems fully coordinated with structural drawings and details, and coordinated with architectural finish components such as ceilings, bulkheads, furring, casework and equipment, indicating ductwork, piping, conduit, and equipment in their intended locations, coordinated with all other parts of the Work and highlighting potential interference between systems and building components.

1.5 COORDINATION DOCUMENTS

.1 Prepare Field Coordination Plan and Section Drawings indicating coordination for the following:

.1 Installation of subgrade plumbing work.

.2 Installation of above ceiling mechanical and electrical work coordinated with the structure and architectural ceiling heights for efficient use of available space, for proper sequence of installation, and to resolve interferences.

.3 Scale:

.1 Plans: Not less than 1:50 metric.

.2 Sections: Not less than 1:20 metric.

.3 Details: Not less than 1:10 metric.

.4 Clearly indicate changes to the location, direction, route or grade of mechanical and electrical work shown in the Contract Documents that are required or necessary arising from the coordination of the Work.

.5 Reproduce and distribute copies at Coordination Meeting to each concerned party in accordance with Section 01 31 19.

.6 Update and revise as necessary after each Coordination Meeting.

.2 Maintain coordination documents throughout construction period, recording changes arising from modifications and adjustments; submit finalized coordination documents after completion of Project in accordance with Section 01 78 00.

1.6 MECHANICAL AND ELECTRICAL COORDINATION

.1 Coordinate work between Divisions 02 to 14 inclusive and Divisions 21 to 28.

.2 Coordinate progress schedules, including dates for submittals and for delivery of products.

.3 Conduct conferences between Subcontractors, other contractors and other concerned entities as necessary to establish and maintain coordination and schedules and to resolve matters identified by coordination activities.

.4 Participate in Progress and Coordination Meetings; report on work requiring adjustment under coordination requirements, and any needed changes in schedules or in the work to resolve interferences between components of the Work.

.5 Transmit minutes of coordination to all attendees and concerned individuals in accordance with Section 01 31 19.

.6 Implementation of changes required as a result of coordination activities shall be performed as follows:

.1 Work Considered as No Change to Contract: Changes that do not materially increase or decrease the Scope-of-Work of the Contract, shall not be considered as additional work under Contract.

.2 Work Considered as Change to Contract: Changes that do materially increase or decrease the Scope-of-Work of the Contract, will be administered as a Change to the Contract in accordance with General Conditions of Contract.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work and at the call of Consultant.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Consultant Team and Owner.

.4 Provide physical space and make arrangements for meetings.

.5 Lead meetings.

.6 Record meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and affected parties not in attendance.

.8 Representatives of Contractor, Contractors and Suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 CONSTRUCTION PARTNERING WORKSHOP

.1 Within 30 days after award of Contract, a meeting of parties in Contract shall be called to discuss and resolve administrative procedures and responsibilities.

.2 Representatives of Contractor and major Trades/Contractors shall be in attendance. Consultant shall be notified 7-days in advance of meeting and invited to attend and shall receive minutes of meeting whether in attendance or not.

.3 Contractor will coordinate time and location of meeting and notify parties concerned minimum 10 days before meeting.

.4 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Schedule of Work: in accordance with Construction Progress Schedules.
- .3 Schedule of Submittals: Provide a list of all required shop drawings, cutsheets, samples, colour chips, etc. Submit submittals as specified.
- .4 Development and implementation strategies of Project six-week look-ahead schedules, trade cross-referenced and coordinated weekly work plans, trade tool box meetings, and project flow visualizations to maximize production in realizing Developer objectives.
- .5 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.
- .6 Delivery schedule of specified equipment.
- .7 Site security and fencing.
- .8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .9 As-built drawings and record documents.
- .10 Maintenance manuals.
- .11 Take-over procedures, acceptance, and warranties.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PRECONSTRUCTION FIELD MOCK-UP WORKSHOP

.1 Refer to Section 01 11 00 – Summary of Work, item 1.6 PRECONSTRUCTION FIELD MOCK-UPS for scope of work.

.2 Within 10 working days of approval of a pre-construction field mock-up, a meeting of the Project Team shall be called to discuss lessons learned and identify Project-specific best practices.

.3 Representatives of Contractor and major Trades/Contractors shall be in attendance; Consultant shall be notified 7-days in advance of meeting and invited to attend and shall receive minutes of meeting whether in attendance or not.

.4 Contractor will coordinate time and location of meeting and notify parties concerned minimum 10 days before meeting.

.5 Agenda to include:
- .1 Identification and discussion of lessons learned.
- .2 Identification and discussion of Project-specific best practices, including but not necessarily limited to cooperation, coordination, transitions, tying-in, building-in, Product delivery schedules, scheduling, potential interferences, materials and Products.
- .3 Identification and discussion of proposed substitutions, meeting requirements of Section 01 62 00 – Product Options and Substitutions.
  - .1 Provide copies of all required Product information, datasheets, cut sheets, finish brochures, etc., to all meeting attendees 10-days in advance of meeting. Where practicable, Provide samples.
- .4 Other items that arise during meeting that require discussion and resolution.

1.4 PROGRESS MEETINGS

.1 Prior to start of Work, submit a Contact List for all key Contractor contacts to Consultant and Client for review.

.2 Prior to start of Work, submit Progress Meeting minutes template to Consultant and Client for review.

.3 During the course of Work, schedule progress meetings every two (2) weeks, unless directed otherwise..

.4 Representatives of Contractor and major Trades/Contractors shall be in attendance; Consultant shall be notified 7-days in advance of meeting and invited to attend each meeting and shall receive minutes of meetings whether in attendance or not.

.5 Notify parties minimum 10-days prior to meetings.

.6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5-days after meeting.

.7 Agenda to include the following:
- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Six-week look-ahead schedule.
- .4 Project Coordination.
- .5 Review opportunities to maximize production through coordinated weekly work plans, trades cross-referencing to enable visualization of potential bottlenecks, and respective solution-finding.
- .6 Field observations, problems, conflicts.
- .7 Problems which impede construction schedule.

.8 Review of off-site fabrication delivery schedules.
.9 Corrective measures and procedures to regain projected schedule.
.10 Revision to construction schedule.
.11 Progress schedule, during succeeding work period.
.12 Review submittal schedules: expedite as required.
.13 Maintenance of quality standards.
.14 Review proposed changes for affect on construction schedule and on completion date.
.15 Other business.

END OF SECTION

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. Typically, bar chart, activities or other Project elements are listed down the left side of the chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally, Bar Chart should be derived from commercially available computerized project management system.

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

.4 Construction Schedule: shall mean Project Schedule.

.5 Construction Work Week: Monday to Friday, inclusive, will provide 5-day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.6 Duration: number of work periods (not including holidays or other non-working periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.7 Master Plan: summary-level schedule that identifies major activities and key milestones.

.8 Milestone: significant event in project, usually completion of major deliverable.

.9 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

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

1.2 REQUIREMENTS

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

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

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

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

.5 Submit Detail Schedules to Contractor and Consultant within 15 working days of Award of Contract in the form of a Bar (GANTT) Chart for purposes of creation of a Master Plan, and Project planning, coordinating, monitoring and reporting Work progress.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit a preliminary project Master Plan during the Bid period in accordance with Instructions to Bidders.

.3 Submit Project Schedule to Consultant within 15 working days of Award of Contract, including project Master Plan. Update weekly as required for duration of project.

1.4 PROJECT SCHEDULE

.1 Develop a detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types the following items, selected as applicable to Contractor's scope of Work:

- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Inspections by authorities having jurisdiction.
- .6 Building Sitework:
  - .1 Site preparation.
  - .2 Site improvements and landscaping.
  - .3 Site mechanical Utilities.
  - .4 Site electrical utilities.
  - .5 Site communications utilities.
- .7 Superstructure:
  - .1 Foundations.
  - .2 Basement Excavation.
  - .3 Basement Walls.
- .8 Superstructure:
  - .1 Floor Construction.
  - .2 Roof Construction.
- .9 Exterior Enclosure:
  - .1 Exterior Walls.
  - .2 Exterior Windows.
  - .3 Exterior Doors.
- .10 Roof Coverings.
- .11 Interior Construction:
  - .1 Partitions.
  - .2 Interior Doors and Screens.
  - .3 Fittings.
- .12 Stairs:
  - .1 Stair Construction.
  - .2 Stair Finishes.
- .13 Interior Finishes:
  - .1 Wall Finishes.
  - .2 Floor Finishes.
  - .3 Ceiling Finishes.
- .14 Services:
  - .1 Elevators.
  - .2 Plumbing.

.3 HVAC.
.4 Fire Protection.
.5 Electrical.
.6 IT and Security.

.15 Equipment and Furnishings:
.1 Equipment.
.2 Fixed Furnishings.

.16 Specialties.

.17 Commissioning.

.18 Demobilization.

.19 Closeout submissions.

.20 Supplied equipment and long delivery items.

.21 Required dates for supplied equipment.

1.5 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule every two weeks reflecting activity changes and completions, as well as activities in progress.

.2 Include, as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.6 PROJECT MEETINGS

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

.2 Weather related delays with their remedial measures will be discussed and negotiated.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Prior to start of Work, Contactor shall submit a Schedule of Submittals describing all submittals described in the Contract Documents.

.2 Submit all required submittals listed for review using online document management system.

.3 Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

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

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

.7 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

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

.9 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Where required, submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of Ontario, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 6 working days for Consultant's review of each submission.

.5 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect the value of Work, state in writing to the Consultant prior to proceeding with Work.

.6 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify the Consultant in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.9 After the Consultant's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.

- .1 Report signed by an authorized official of a testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .2 Testing must have been within 3 years of the date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.

.17 Delete information not applicable to project.

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

.19 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.20 The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general design concept.

.1 This review shall not mean that Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of Work of sub-trades.

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultant's business address.

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

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

.5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

.1 Erect mock-ups as specified in other specification sections.

1.5 PHOTOGRAPHS: DIGITAL FORMAT

.1 Progress Photographs

.1 Sizes: minimum 2 megapixel image file size, jpeg image file.

.2 Viewpoints: A minimum of four (4) photographs from three (3) different viewpoints will be required.

.3 Number of photo sets: one (1) set per month.

.4 Identification: referenced to photo file with name, location, purpose, and number of project and date of exposure.

.5 Viewpoints: interior and exterior locations: viewpoints determined by Consultant.

.6 Frequency: at completion of excavation, foundation, framing, and services before concealment and at completion of each discrete phase of construction.

.7 Distribution: post photographs to an on-line folder established by Contractor or Consultant.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Prior to Contract start-up and commencement of work onsite, submit Workers' Compensation Board status.

.2 Prior to Contract start-up and commencement of work onsite, submit transcription of insurance.

END OF SECTION

1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario

.1 Occupational Health and Safety Act, Regulations, and amendments.

1.2 SUBMITTALS

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

.2 Submit a signed “Notice of Project” pursuant to the Occupational Health and Safety Act (OHSA) under the Regulation for Construction Projects.

.3 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.4 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant and authority having jurisdiction, weekly.

.5 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.6 Submit copies of incident and accident reports.

.7 Submit WHMIS MSDS - Material Safety Data Sheets.

.8 Consultant will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant within 7 days after receipt of comments from Consultant.

.9 Consultant's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.10 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant

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

1.3 FILING OF NOTICE

.1 File Notification of Project with Provincial authorities prior to beginning of Work.

.1 According to Section 6 of the Regulation for Construction Projects (O. Reg. 213/91) constructors are required to notify the Ministry of Labour before construction begins of any project meeting any of the requirements applicable to this section.

.2 Registration of Constructors and Employers Engaged in Construction:

.1 According to Section 5 of the Regulation for Construction Projects (O. Reg. 213/91), before beginning work at a project every constructor and employer engaged in construction has to complete an approved registration form.

.2 This form does not have to be submitted to the Ministry of Labour, but it must be at the project while the employer is working there.

.3 Notice of Trench Work:

.1 Notify the Ministry of Labour, before work is begun at a construction project, if the project includes work on a trench more than 1.2 metres deep into which a worker may enter.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Consultant and Contractor prior to commencement of Work.

1.6 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Consultant may respond in writing, where deficiencies or concerns are noted and may request resubmission with correction of deficiencies or concerns.

1.7 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act of Ontario.

1.9 UNFORESEEN HAZARDS

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

1.10 CONSTRUCTOR

.1 Responsibility for Work Site Safety – The Contractor Is "Constructor":

.1 The Contractor shall, for the purposes of the Occupational Health and Safety Act (Ontario), and for the duration of the Work of this Contract:

.1 Be the "Constructor" for the "Work Site", and

.2 Meet requirements of the Occupational Health and Safety Act and regulations made under the Act, Workplace Safety and Insurance Board requirements, Fire Code legislation, Workplace Safety and Insurance Act, and all other applicable laws, ordinances and by laws that govern workplace safety.

.2 The Contractor shall direct all Contractors, sub-subcontractors, Other Contractors, employees, Suppliers, workers and any other persons at the "Work Site" on safety related matters, to the extent required to fulfill its "Constructor" responsibilities pursuant to the Act, regardless of:

.1 Whether or not any contractual relationship exists between the Contractor and any of these entities, and

.2 Whether or not such entities have been specifically identified in this Contract.

.3 Safety Certification: Safety certification is a condition of Contract award for Contractor, and all Contractors, sub-subcontractors, and Suppliers accessing the worksite; a valid Certificate of Recognition (COR™) shall be maintained through the Infrastructure Health and Safety Association™ (IHSA) of Ontario for the duration of the Work of this Project

1.11 POSTING OF DOCUMENTS

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

1.12 CORRECTION OF NON-COMPLIANCE

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

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

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

1.13 BLASTING

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

1.14 POWDER ACTUATED DEVICES

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

1.15 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.16 FIRE SAFETY

.1 The Contractor is responsible for on-site fire safety during the project, and shall establish policies and procedures sufficient to manage risk and safeguard the Work as required to prevent fires.

.2 A Firewatch is a person assigned to observe ongoing hot work (welding, use of torches, etc.) to identify and react to hazards. A Firewatch is necessary at any time where hot Work (e.g., welding, etc.) is performed in locations where a fire greater than a minor one might develop.

.3 Before hot work begins, written permission, like a hot work permit, must be issued by the Contractor.

.4 Inspect the work area for any sources of fuel, such as trash, rags and flammable materials and liquids. This applies to lower decks or levels where sparks or slag could fall.

.5 Some of the responsibilities of a Firewatch include:

.1 Having fire extinguishing equipment readily available;

.2 Know how to sound an alarm in the event of a fire;

.3 Monitor for fires in all exposed areas, including lower decks or levels;

.4 Attempt to extinguish the fire only within the capacity of available equipment, if not sound the alarm;

.5 Monitor all hot work areas for at least half an hour after hot work operations stop.

.6 The Firewatch cannot have any other duties while monitoring the hot work.

.7 A Firewatch can have no other duties during hot work. Continuous surveillance must be maintained throughout the course of the hot work, including a minimum 2-hour cool down period after hot work concludes, or longer if determined by the Contractor's health and safety risk assessment.

.8 Fire Separations:

.1 Ensure that fire separations are installed to maintain total integrity and that they are not breached by Work following their installation.

.2 Replace fire separations which have suffered a lessening of their required rating during construction.

.9 Fire watch and Evacuations:

.1 Hot Work: means activities involving open combustion including, but not limited to use of torches, fires and welding equipment.

.2 Maintain a 2-hour fire watch following completion of Hot Work day and at all times during Hot Work.

.1 Scan hot work locations prior to leaving site at end of each workday using a spot thermal camera; e.g., similar to FLIR TG165 Spot Thermal Camera, by FLIR.

.3 Maintain a system of evacuation alarms, strategically located throughout the construction site and capable of being heard by workers wearing hearing protection in high noise areas of the workplace.

.4 Provide for multiple means of egress from the construction areas for workers during all phases of construction and brief workers periodically on such escape routes.

1.17 REPORTING FIRES

.1 Post a notice indicating the location of the nearest fire alarm box and telephone, including the emergency telephone number.

.2 Report immediately all fire incident to the Fire Department.

.3 The person reporting the fire shall ensure that the Fire Department is adequately directed to the scene of the fire.

.4 Give location of fire, name or number of building and be prepared to verify the civic address, or other definitive location.

END OF SECTION

1.1 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Consultant Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.4 Environmental protection plan, include:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided, including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.3 FIRES

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

1.4 DISPOSAL OF WASTES

.1 Strictly adhere to requirements of Section 01 74 19 – Waste Management and Disposal. Do not bury rubbish and waste materials on site unless approved by Consultant.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.5 DRAINAGE

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

.2 Do not pump water containing suspended materials into waterways or drainage systems. Migration to water retention pond is allowed.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties where indicated on Drawings and in Specifications.

.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.

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

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by Consultant.

1.7 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

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

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

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

1.8 NOTIFICATION

.1 Consultant will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Consultant of proposed corrective action and take such action for approval by Consultant.

.3 Consultant will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.9 EROSION AND SEDIMENTATION CONTROL

.1 Comply with the requirements of Section 31 25 00 - Erosion and Sedimentation Control.

END OF SECTION

Part 1 General

1 REFERENCE STANDARDS

.1 ANSI/ASHRAE 52.2-2017: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

.2 ANSI/ASHRAE 62.1-2016: Ventilation for Acceptable Indoor Air Quality.

.3 EPA: EPA Protocol for Environmental Requirements, Testing for Indoor Air Quality Baseline IAQ.

.4 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

.1 SMACNA 008-2008 (Chapter 3), IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition.

2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

.1 The intent of this plan is to prevent construction and future indoor air quality problems that may result from construction affecting the comfort and well being of construction workers and building occupants.

.2 The provision of the Construction Indoor Air Quality Management Plan or IAQ Management Plan is the responsibility of the Contractor.

.3 Provide a fully developed IAQ Management Plan implemented through construction and pre-occupancy of the building including the following activities:

.1 Meet or exceed the recommended Design Approaches in SMACNA 008 (Chapter 3) and other requirements as detailed in this specification during all construction activities. These design approaches shall be applicable for all buildings regardless of whether it is a new construction or renovation.

.2 Protect all stored and installed absorptive materials from moisture or dust, chemical and gas damage as specified in Section 01 61 00 - Common Product Requirements.

.3 Construction use of air handling units, heat recovery ventilators, fans or any associated equipment and systems for ventilation, heating, dehumidification, humidification, dust control or any other use is strictly prohibited.

.4 Replace all filtration equipment for air handling units, heat recovery ventilators and fans with new filter media as specified within the technical specification sections in Division 23 at the end of construction.

.4 Provide the following submittals to the requirements of Section 01 33 00 - Submittal Procedures:

.1 IAQ Management Plan:

.1 Provide a draft documented IAQ Management Plan in writing for review by the Engineer within 21 days of award of contract.

.2 The IAQ Management Plan submission is to include:

.1 Details of each management plan strategy including:

.1 The Design Approaches in SMACNA 008 (Chapter 3) including:

.1 HVAC Protection

.2 Source Control procedures

.3 Pathway Interruption

.4 Housekeeping

.5 Scheduling

.6 Flush-out

.7 QA / QC Reporting

.2 Samples of reporting documents based on SMACNA 008 (Chapter 3).

.3 Methods for protecting all stored and installed absorptive materials from moisture or dust, chemical and gas damage.

.4 Declaration that air handling units, heat recovery ventilators, fans or any associated equipment and systems will not be used during construction for ventilation, heating, de-humidification, humidification and dust control.

.5 Schedule for filter replacement as a component of the building start-up and Commissioning.

.3 Format: submit 5 copies of reports, each in "D" ring binders, complete with index tabs for verification and review by Engineer.

.4 Make changes or additions to the draft IAQ Management Plan within the specified plan requirements to the satisfaction of the Engineer and reissue as final draft.

.5 Distribute the final IAQ Management Plan to all trades working on the site.

.2 Construction Reporting

.1 During the course of construction provide the following reporting to the Engineer for review:

.1 Photographs indicating the general conformance to the IAQ Management Plan.

.2 Completed Planning Checklist for all trades on the project indicating scheduling and the requirements of IAQ procedures with respect to scheduled construction activities for that week.

.3 Inspection sheets completed by the Site Superintendent reviewing that all trades completed the scheduled requirements of the IAQ procedures for that week including any deficiencies and corrective actions taken.

.2 Provide all reporting on a weekly basis unless otherwise approved by the Engineer during periods of low IAQ risk construction or low construction activity.

.5 Provide the following close-out submittals to the requirements of Section 01 78 00 - Closeout Submittals:

.1 Provide all IAQ Management Plan submittals including the following:

.1 The final version of the Construction IAQ Management Plan.

.2 Digital copies of all weekly photographs in a CD ROM Format.

.3 All weekly planning checklists.

.4 All weekly inspection sheets.

.5 Format: submit 5 copies of closeout report, each in "D" ring binders, complete with index tabs for verification and review by Engineer.

.6 Provide the following activities specified to meet or exceed the recommended Design Approaches in SMACNA 008 (Chapter 3) during all construction activities. These design approaches shall be applicable for all buildings regardless of whether it is a new construction or renovation:

.1 HVAC Protection:

.1 Where adjacent spaces in the building will be occupied while Work is ongoing, the Contractor shall maintain pre-construction heating, cooling, ventilation, and humidity levels.

.2 Where construction materials are required to be stored on site, the contractor shall maintain adequate temperature and humidity as required by the manufacturers instructions such that no warping or damage occurs.

.3 Use of air handling units, heat recovery ventilators, fans or any associated equipment and systems for ventilation, heating, de-humidification, humidification, dust control or any other use during Construction is strictly prohibited.

.4 Seal off all supply, return and exhaust air system openings to prevent the accumulation of dust and debris in the systems at all times unless work is being completed on the immediate area of the system using plastic seals to the approval of the Engineer. This is to include overnight and longer work stoppages. All diffusers, grilles, and displacement ventilators are also to be sealed in plastic.

.5 Protect all stored and installed absorptive materials from moisture and dust, chemical and gas damage as specified in Section 01 61 00 – Basic Product Requirements.

.6 Keep all operable doors on all air handling units closed at all times unless work is being completed on the immediate area of the system.

.7 Do not store construction or waste materials in Fan and Mechanical Rooms.

.8 Keep all construction areas clean and neat as specified elsewhere in this specification.

.9 Replace all filtration equipment for air handling units, heat recovery ventilators and fans with new filter media as specified with the technical specification sections in Division 22 at the end of construction.

.10 Where ducts become contaminated due to inadequate protection these ducts will be cleaned professionally as specified in Division 23.

.2 Source Control:

.1 Use of low VOC products as specified elsewhere are to be utilized at all times.

.2 Restrict traffic volume and idling of motor vehicles where emissions could be drawn into the building.

.3 Direct fired construction heaters are not acceptable. Vent all construction heater products of combustion to the outdoors.

.4 Cycle heating equipment off when not being used or needed.

.5 Exhaust all pollution sources to the outside with portable fan systems ensuring exhaust does not re-circulate back into the building.

.6 Keep containers of wet products closed as much as possible. Cover and seal waste materials, which can release odour or dust.

.3 Pathway Interruption:

.1 Prevent dust from migrating to other areas with the use of dust curtains or temporary enclosures where applicable.

.2 Relocate pollutant sources as far away as possible from construction ventilation equipment, stored materials and areas occupied by workers when feasible. Any construction supply and exhaust systems that ventilate both areas where pollutant sources are being used and areas where they are not been used should be shut down or isolated during such activity with supplemental construction ventilation provided as required.

.3 Isolate during construction, areas of work to prevent contamination of clean or occupied areas. Utilize pressure differentials generated by mechanical means to prevent contaminated air from entering clean areas.

.4 Ventilate contaminated air from construction areas directly to the outside during installation of VOC emitting materials.

.4 Housekeeping:

.1 Cleaning activities are specified in Section 01 74 11 however provide special emphasis on HVAC equipment and building spaces to remove contaminants from the building prior to operation of any permanent ventilation equipment.

.2 Keep all coils, filters, fans and ductwork clean during installation as specified and clean all prior to performing the Testing, Adjusting and Balancing of the systems.

.3 During construction suppress dust with wetting agents or sweeping compounds. Use efficient and effective dust collecting methods such as a damp cloth, wet mop, and vacuums with particulate filters, or wet scrubbers.

.4 Remove accumulations of water inside the building during construction. Protect all porous materials such as insulation and ceiling tile from exposure to moisture.

.5 Scheduling:

.1 Schedule work to ensure dust emitting work does not coincide with installation of absorbent materials (ceiling tiles, gypsum wall board, fabric furnishings, carpet and insulation, for example) that may act as 'sinks' for dust.

.2 Do not schedule any construction activities that would require the use of VOC or dust emitting activities during occupancy without the approval of the Engineer.

.3 Schedule all use of VOC emitting and high odorous materials BEFORE installing absorbent materials (ceiling tiles, gypsum wall board, fabric furnishings, carpet and insulation, for example) that may act as 'sinks' for VOCs, odours and other contaminants.

END OF SECTION

1.1 SUMMARY

.1 Delegated Design Submittals shall account for professional engineering responsibility for design, review and acceptance of components of Work forming a part of permanent Work in accordance with Ontario Building Code, including errata and amendments, and that has been assigned to a design entity other than Consultant including, but not limited to, the following:

.1 Design requiring structural analysis of load bearing components and connections.

.2 Design requiring compliance with fire safety regulations.

.3 Design requiring compliance with life or health safety regulations.

.2 Delegated Design Submittals are not required for components of Work requiring engineering for temporary Work (e.g., crane hoisting, engineered lifts, falsework, shoring, concrete formwork) that would normally form a part of Contractor's scope of Work.

.3 The requirements of this section are in general conformance with recommended *Professional Engineering Practice,* published by Professional Engineers Ontario (PEO) with regards to duties of professionals appointed during construction period by Contractor.

.4 The requirements of this section do not diminish responsibilities of Consultant's role as Registered Professional of Record. Submittals will be used by Consultant to establish that Work is substantially performed in accordance with Ontario Building Code.

1.2 DELEGATED DESIGN

.1 Performance and Design Criteria: Provide products and systems complying with specific performance and design criteria indicated where professional design services or certifications by a design professional are specifically required of Contractor by Contract Documents.

.2 If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to the Consultant.

.3 Delegated design will be required for elements designed by a specialty professional, loads as determined per OBC requirements, which may include but are not necessarily limited to the following:

.1 Elements normally fabricated off-site

.2 Elements that require specialized fabrication equipment or a proprietary fabrication process not usually available at job site (i.e.: open web steel joists, wood trusses, combination wood and metal or plywood joists, prefabricated wood or metal buildings, noise and vibration isolation devices, elevators).

.3 Elements requiring civil engineering, not normally a part of scope of services performed by architectural; structural; mechanical; electrical; or geotechnical disciplines of Consultant.

.4 Refer to specifications for sections requiring engineered shop drawings and/or other submittals and submit to Consultant Team for review prior to start of relevant scope of Work.

1.3 LETTER OF COMMITMENT

.1 Submit a signed and sealed Letter of Commitment on company letterhead addressed to Consultant in accordance with format in Appendix A attached to the end of this Section prior to starting Work requiring design and seal of a professional engineer.

1.4 LETTER OF COMPLIANCE

.1 Submit a signed and sealed Letter of Compliance on company letterhead addressed to Consultant in accordance with format in Appendix B attached to the end of this Section on completion of Work requiring design and seal of a professional engineer.

1.5 IMPLEMENTATION

.1 Include summary of Work described in relevant technical specification section as a part of the required Letter of Commitment.

.2 Prepare required submittals and present to Consultant within sufficient time to allow for Consultant's detailed review and acceptance.

END OF SECTION

APPENDIX A

LETTER OF COMMITMENT

Submit a signed and sealed letter of commitment on company letterhead in the form as follows:

[***Date***]

[***Consultant***]
[***Consultant's Address***]

Attention: [***Consultant's Registered Professional of Record***]

Re: Letter of Commitment for Delegated Design of [***System of Component of Work***]
[***Project Name***]
[***Project Address***]
[***Date of applicable tender package***]

As the retained registered professional engineer for design and field review of the above named component of Work and project, I hereby give assurance I am qualified to perform the following Work as required by Contract Documents:

1. [***List appropriate design services for System or Component of Work***];
2. Preparation of shop and erection documents;
3. Review fabrication of [***structural***] [***fire rated***] [***life and health safety***] components;
4. Review erection of [***structural***] [***fire rated***] [***life and health safety***] components.
5. [***Modify list to suit System of Components of Work.***]

I hereby give assurance that I will be responsible for above noted Work as described in [***Number / Title of Spec Section***] of Project Manual, including requirements of addenda, change orders and change directives.

I also undertake to be responsible for field review of fabrication and erection of [***structural***] [***fire rated***] [***life and health safety***] components as required to ascertain substantial compliance with the Ontario Building Code and Contract Documents.

I will notify you in writing if my responsibility is terminated at any time during the course of Work covered by this Letter of Commitment.

Retained Professional Engineer

_____
Signature

_____
Date

[***Apply Seal***]

APPENDIX B

LETTER OF COMPLIANCE

[***Date***]

[***Consultant***]
[***Consultant's Address***]

Attention: [Consultant's Registered Professional of Record]

Re: Letter of Compliance for Delegated Design of [***System of Component of Work***]
[***Project Name***]
[***Project Address***]
[***Date of applicable tender package***]

I hereby give assurance that I have fulfilled my obligations for field review as outlined by previously submitted Letter of Commitment.

I hereby give assurance that aspects of [***structural***] [***fire rated***] [***life and health safety***] Work as defined by previously submitted Letter of Commitment substantially comply with Contract Documents and Building Code.

Retained Professional Engineer

_____

_____
Signature

_____
Date

[***Apply Seal***]

1.1 REFERENCES AND CODES

.1 The following establishes the minimum requirements of the Contract:

.1 Ontario Building Code 2012, errata and amendments.

.2 Contract Documents.

.3 Specified standards, Codes, and referenced documents found in Contract Documents.

.4 Orders and directions from authorities having jurisdiction.

.2 Province of Ontario - Work shall comply with the following, including errata and amendments:

.1 Perform Work in accordance with the laws and regulations of the Province of Ontario applicable to the Work, and to the direction of the authorities having jurisdiction.

.2 Ontarians with Disabilities Act, 2001, S.O. 2001, c. 32.

.3 Occupational Health and Safety Act.

.4 Occupational Health and Safety Act, Ontario Regulation 213/91 Construction Project.

.5 Environmental Protection Act, R.S.O. 1990, c. E.19.

.6 Construction Lien Act, R.S.O. 1990, c. C.30.

.7 Ontario Employment Standards Act, 2000, S.O. 2000, c. 41 and Regulations under this Act.

.8 Other laws and regulations applicable to the Work.

.3 Regions and Municipalities:

.1 Perform Work in accordance with the by-laws, regulations and ordinances of the City of Hamilton, Ontario, and to the direction of the authorities having jurisdiction.

1.2 FLAME-SPREAD RATINGS

.1 The interior wall and ceiling finishes throughout the building shall conform to the flame spread ratings of OBC Subsection 3.1.13.

.2 Flame-spread rating and smoke developed classification for all finishes shall be determined under ULC S102 or ULC S102.2 as appropriate, or in accordance with 2012 OBC Supplementary Standard SB-2.

.3 The flame-spread ratings for interior finishes are summarized as follows:

Occupancy, Location or Element	**Maximum Permitted Flame-Spread Rating for Wall Surfaces**	**Maximum Permitted Flame-Spread Rating for Ceiling Surfaces**
Exit stairways and exit corridors[1]	25	25
Public corridors and corridors not within suites	150	150
Elevator cars	75	75
Elevator vestibules	25	25

Services spaces, service shafts, service rooms	25	25
Doors (including overhead garage doors)	200	NA
Plumbing fixtures	200	200
Other locations and other elements	150	150
[1] The flame spread rating for exits applies to any surface in the exit that would be exposed by cutting through the material in any direction, excluding doors.		

.4 Combustible plumbing fixtures, including shower and tub caps and surrounds shall be fabricated of material having a flame-spread rating not exceeding 200.

.5 If combustible interior wall and ceiling finishes are used in the building, they shall not be more than 25 mm thick, and flame-spread restrictions apply to any surface that would be exposed by cutting.

.6 The maximum allowable flame-spread rating of walls and up to 10% of a ceiling area within a sprinklered floor area, excluding exits and vertical service spaces, is 150; the remainder of the ceiling area shall have a flame spread rating not exceeding 25.

1.3 ASBESTOS MATERIAL DISCOVERY

.1 Asbestos: Work involving contact with asbestos containing materials is hazardous to health. Review MSDS for each material and product to be used, and should material or product resembling or containing asbestos be encountered in course of Work, do not use product, immediately stop work at location, and notify Consultant.

1.4 BUILDING SMOKING ENVIRONMENT

.1 No smoking of any kind is permitted on or immediately adjacent to the Place of the Work, including electronic cigarettes or devices.

.2 Smoking restrictions apply to all persons at all times without exception.

1.5 WORKPLACE SAFETY AND INSURANCE

.1 Comply with the Ontario Workplace Safety and Insurance Act, 1997, S.O. 1997, c. 16, Schedule A and Regulations under this Act, including errata and amendments.

1.6 LABOUR STANDARDS

.1 Comply with the Ontario Employment Standards Act, 2000, S.O. 2000, c. 41 and Regulations under this Act, including errata and amendments.

1.7 HARASSMENT POLICY

.1 Develop workplace harassment and offensive language policy and procedures. Submit to Consultant within 15 days of award of Contract.

1.8 BUILDING CODE

.1 Comply with the Ontario Building Code Act, 1992, S.O. 1992, c. 23, including errata and amendments, and Regulations under this Act, including but not necessarily limited to O. Reg. 332/12 BUILDING CODE, including errata and amendments.

1.9 EMPLOYMENT INSURANCE

.1 Comply with the provisions of the Employment Insurance Act (S.C. 1996, c. 23) and Regulations (SOR /96-332) of Canada, including errata and amendments.

END OF SECTION

1 ABBREVIATIONS AND ACRONYMS

.1 The definitions, abbreviations and acronyms found in the Ontario Building Code apply. The following are typical abbreviations and acronyms frequently used in the Contract Documents:

Acronym	Definition / Meaning
AAC	Accessibility Advisory Committee
ADA	American Disabilities Act
AFF	Above Floor Finish
AHJ	Authorities Having Jurisdiction
ANSI	American National Standards Institute
AODA	Accessibility for Ontarians with Disabilities Act
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASTM	American Standards for Testing Methods
A/V	Audio-Visual
AWMAC	Architectural Woodwork Manufacturers Association of Canada
BAS	Building Automated Systems
CACF	Central Alarm Control Facility
CBIP	Commercial Building Incentive Program
CCA	Canadian Construction Association
CDA	Canadian Disability Act
CFCs	Chlorofluorocarbons
CFL	Compact Fluorescent Light
CGSB	Canadian General Standards Board
CMHC	Canada Mortgage and Housing Corporation
COP	Coefficient of Performance
CPTED	Crime Prevention Through Environmental Design

CSA	Canadian Standards Association
CSC	Construction Specifications Canada
CBIP	Commercial Building Incentive Program
CCA	Canadian Construction Association
CDA	Canadian Disability Act
CFCs	Chlorofluorocarbons
CFL	Compact Fluorescent Light
CGSB	Canadian General Standards Board
CMHC	Canada Mortgage and Housing Corporation
COP	Coefficient of Performance
CPTED	Crime Prevention Through Environmental Design
CSA	Canadian Standards Association
csc	Construction Specifications Canada
CSI	Canadian Specifications Institute
DOC	Direct Digital Control
DHW	Domestic Hot Water
EER	Energy Efficient Ratio
GFI	Ground Fault Interrupt
HHC	Heritage and Historical Society
HRAI	Heating, Refrigerating and Air Conditioning Institute
HRV	Heat Recovery Ventilator
HSA	Health and Safety Act
HVAC	Heating Ventilation and Air Conditioning
IESNA	Illuminating Engineering Society of North America.

IIC	Impact Insulation Class
IT	Information Technology
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
Low-E	Low-Emissivity
MDF	Medium Density Fibreboard
MEC	Model Energy Code
MNECB	Model National Energy Code of Canada for Buildings
MOECC	Ministry of the Environment and Climate Change
MOL	Ministry of Labour
Mpa	MegaPascals
MPDA	Master Painters' and Decorators' Association
MTKA	Modified Turnkey Agreement
MTO	Ministry of Transportation
NBC	National Building Code of Canada
NC	New Construction
NFA	Net Floor Area
NRC	National Research Council
OBC	Ontario Building Code
OFC	Ontario Fire Code
OHSA	Ontario Health and Safety Act
PLO	Power Light Density
PM	Project Manager
PVC	Polyvinyl chloride
RFP	Request for Proposal
sec	Standards Council of Canada
SMACNA	Sheet Metal & Air Conditioning Contractors' National Association
STC	Sound Transmission Class

TPO	Thermoplastic Polyolefin
TSSA	Technical Standards and Safety Authority
ULC	Underwriters Laboratories of Canada
VOE	Volatile Organic Compounds
VSD	Variable Speed Drive
WSIB	Workplace Safety Insurance Board

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

.5 Equipment and system adjust and balance.

1.2 TERMS AND DEFINITIONS

.1 Corrective Actions: Steps that are taken to remove the causes of an existing non-conformity or undesirable situation. The Corrective Action Process is designed to prevent the recurrence of non-conformities or undesirable situations. It tries to make sure that existing non-conformities and situations do not happen again. It tries to prevent recurrence by eliminating causes. Corrective Actions address actual problems. Because of this, the corrective action Process can be thought of as a problem-solving Process.

.2 Hold Point: A mandatory verification point beyond which a Work Process shall not proceed without authorization by Consultant. Hold Points may be nominated by Consultant. The issuance of a Non-Conformance or Corrective Action report by Consultant automatically creates a Hold Point for the Work Processes affected.

.3 Inspection and Testing Plan (ITP): A document that records the inspection and testing requirements of the Contract. The Inspection and Testing Plan identifies the items of materials and Work to be inspected or tested, by whom and at what stage or frequency, Hold and Witness Points, references to relevant standards, acceptance criteria, and the records to be maintained.

.4 Mock-up: a full-size model of a portion of the Work made with the same construction techniques and materials that will be used to meet the requirements of the Contract Documents, and constructed by the same personnel that will be performing the Work at the Site.

.5 Non-conforming Product: When one or more characteristics of a Product fail to meet specified requirements, it is referred to as a Non-Conforming Product. When a Product deviates from specified Product requirements, it fails to conform. Non-conforming Products must be identified and controlled to prevent unintended use or delivery.

.6 Preventative Actions: Steps that are taken to remove the causes of potential non-conformities or potential undesirable situations. The preventive action Process is designed to prevent the occurrence of non-conformities or situations that do not yet exist. It tries to prevent occurrence by eliminating causes. While Corrective Actions prevent recurrence, Preventive Actions prevent occurrence. Both types of actions are intended to prevent non-conformities. In general, the preventive action Process can be thought of as a risk analysis Process.

.7 Process: An integrated set of activities that uses resources to transform inputs into outputs. A system exists whenever several Processes are interconnected using such input-output relationships. Processes are interconnected because the output from one Process becomes the input for another Process.

.8 Product: A Product is the output of a Process. Products can be tangible or intangible.

.9 Quality: Is a set of features or properties of a Product, Process, or system compared with a set of requirements. If those features or properties meet all requirements, 'High Quality' is achieved; if those features or properties do not meet all requirements, 'Low Quality' is achieved.

.10 Quality Assurance (QA): Proactive activities used to provide confidence that Quality requirements will be fulfilled. Quality Assurance activities are determined before Work begins and these activities are performed while the Work is being executed. Examples of Quality Assurance include, but are not limited to, the following:

.11 Process checklists.

.12 Quality system audits.

.13 Methodology and standards development.

.14 Quality Control (QC): Activities used to evaluate Products for conformance to Contract requirements. Example of Quality Control activities include, but are not limited to, inspection and testing.

.15 Quality Management (QM): Includes all the activities used to direct, control, and coordinate Quality. These activities include formulating a Quality policy and setting Quality objectives. They also include Quality planning, Quality Control, Quality Assurance, and Quality improvement.

.16 Quality Management System (QMS): Is a set of interrelated or interacting elements used to direct and control how Quality policies are implemented and Quality objectives are achieved.

.17 Quality Plan: A document that is used to specify the procedures and resources that will be needed to carry out a specific contract, perform a Process, realize a Product, or manage a contract. Quality Plans also specify who will do what and when.

.18 Witness Point: An identified point in a Process where Consultant may review, witness, inspect or undertake tests on any component, method or Process of the Work. Consultant may or may not take the opportunity. Notification of Witness Points must be provided to Consultant no less than 10 calendar days in advance so that attendance may be scheduled if elected.

1.3 CONTRACTOR'S QUALITY MANAGEMENT SYSTEM

.1 The Contractor shall establish, document, implement and maintain a Quality Management System in a manner consistent with the ISO 9001:2015 Quality Management System Requirements, using a Process approach.

.2 The Contractor shall provide a Quality Management Plan describing the Quality Management System as it applies to this Contract. The Contractor shall attach, at minimum, the following procedures to the Quality Plan:

.1 Control of documents: A documented procedure shall be established to define the controls needed:

.1 To approve documents for adequacy prior to issue.

.2 To review and update as necessary and re-approve documents.

.3 To ensure that changes and the current revision status of documents are identified.

.4 To ensure that relevant versions of applicable documents are available at points of use.

.5 To ensure that documents remain legible and are readily identifiable.

.6 To ensure that documents of external origin necessary for the planning and operation of the QMS are identified and distribution controlled.

.7 To prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose.

.2 Submit manufacturer's recommended Hold Points and Witness Points for each technical section of the Specifications for review by the Consultant.

.3 Control of records: A documented procedure to define the controls needed for the identification, storage, protection, retrieval, retention and disposition of records. Records shall remain legible, readily identifiable and retrievable.

.4 Internal audit: A documented procedure to define the responsibilities and requirements for planning and conducting audits, establishing and maintaining records, and reporting results.

.5 Control of Non-Conforming Product: A documented procedure to define the controls and related responsibilities and authorities for dealing with Non-Conforming Product.

.6 Corrective Actions: Establish a documented procedure to define requirements for:

.1 Reviewing non-conformities (including Client or Consultant complaints).

.2 Determining the causes of non-conformities.

.3 Evaluating the need for action to ensure that non-conformities do not recur.

.4 Determining and implementing the actions needed.

.5 Recording the results of the actions taken.

.6 Reviewing the effectiveness of the Corrective Actions taken.

.7 Preventive Actions: Establish a documented procedure to define requirements for:

.1 Determining potential non-conformities and their causes.

.2 Evaluating the need for action to prevent occurrence of non-conformities.

.3 Determining and implementing the actions needed.

.4 Recording the results of the actions taken.

.5 Reviewing the effectiveness of the Preventative Actions taken.

.3 Submit Quality Plan to Consultant for review and approval in accordance with the requirements of Section 01 33 00; submit within 15-days of award of Contract and allow 10-days for Consultant's review.

1.4 REVIEW AND INSPECTION

.1 Do not cover work by other work until inspected and accepted. Generally, no Work shall be covered or otherwise made difficult or impossible to review prior to review.

.2 Notify Consultant minimum 1 week in advance of Hold Points and Witness Points, or in ample time as required to maintain Construction Schedule, whichever period is longer.

.3 Allow Client and Consultants access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

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

.5 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

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

1.5 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Owner for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.

.2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

1.6 ACCESS TO WORK

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

.2 Cooperate to provide reasonable facilities for such access.

1.7 PROCEDURES

.1 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

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

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

1.8 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Client may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Consultant.

1.9 REPORTS

.1 Submit 1 electronic copy each of inspection and test reports to Owner, and Consultant.

.2 Provide copies to Subcontractor(s) of work being inspected or tested, or manufacturer or fabricator of material being inspected or tested.

1.10 TESTS AND MIX DESIGNS

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

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

1.11 MOCK-UPS

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

.2 Construct in all locations acceptable to Consultant and as specified in specific Section.

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

.1 Allow 5 working days in construction schedule for the review of mock-ups after they have been prepared.

.2 Provide 2 weeks' notice for mock-up review to Consultant in advance of preferred review date(s).

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

.5 Mock-Ups Required by Specific Technical Specification Sections:

.1 If noted in the technical section, remove mock-up at conclusion of Work, or when acceptable to Consultant.

.2 Mock-up(s) may remain as part of Work if so stated in the technical specification section.

.3 Specification sections identify whether mock-up may remain as part of Work or if it is to be removed and when.

1.12 MILL TESTS

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

1.13 EQUIPMENT AND SYSTEMS

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

.2 Refer to technical Sections for requirements.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to expedite Work.

.2 Remove from site all such Work after use.

1.2 DEWATERING

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

1.3 WATER SUPPLY

.1 Contractor shall provide an adequate pure (potable) water supply for their own use.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Contractor shall provide adequate temporary heating required for their own use.

.2 Construction heaters used inside building shall be vented to outside or be non-flameless type. Solid fuel salamanders shall not be permitted.

.3 Temporary heat and ventilation required in enclosed areas to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10°C in areas where construction is in progress.

.5 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 HVAC systems of building: Be responsible for damage to HVAC systems if use is permitted.

.7 On completion of Work for which HVAC systems have been used, replace filters and thoroughly clean permanent equipment used during construction.

.8 Ensure Date of Substantial Performance and Warranties for HVAC systems do not commence until entire system is in as near original condition as possible and is certified by Consultant.

.9 Owner will pay utility charges when the temporary heat source is the building equipment. In all other circumstances, Contractor shall provide adequate heating and ventilation for Work.

.10 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 TEMPORARY POWER AND LIGHT

.1 Contractor is responsible for hook-ups to power supply. Contractor shall meter and pay utility charges as required.

.2 Contractor shall arrange for connection with appropriate utility company. Contractor shall pay costs for installation, maintenance and removal.

.3 Contractor shall provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

.4 Contractor shall connect to the power supply in accordance with Canadian Electrical Code and provide meters and switching as required.

.5 Contractor shall use GFCI extension cords when connecting to existing infrastructure as an added measure to prevent damage to existing electrical infrastructure.

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

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Contractor shall provide and pay for temporary telephone, fax, computer, Wi-Fi system (password secured), data lines and equipment necessary for their own use.

END OF SECTION

Part 1 General

1.1 TRENCHING AND SHORING

.1 Comply with O.Reg. 213/91: Construction Projects, Ontario Ministry of Labour's Occupational Health and Safety Act and Regulations, and Technical Standards and Safety Act and Regulations.

.2 Have shoring designed by a Professional Engineer (P.Eng.) licenced to practice in Ontario.

1.2 SCAFFOLDING

.1 Provide scaffolding and protective or insulating tarps as needed in accordance with CAN/CSA S269.2-16, Access Scaffolding for Construction Purposes.

.2 Provide and maintain safe access to Work as required. If access is provided by Client, make financial arrangements for use as indicated in Contract.

1.3 HOISTING

.1 Make financial arrangements with Client for use of hoists and cranes for own purposes.

.2 Hoists and cranes shall be operated by a qualified operator.

1.4 ELEVATORS

.1 One designated permanent elevators may be used by construction personnel and for transporting of materials upon agreed terms with Client. Coordinate use with Client according to agreed terms and conditions.

.2 Provide protective coverings for all finish surfaces of cars and entrances sufficient to protect surfaces and materials.

1.5 SITE STORAGE/LOADING

.1 Do not unreasonably encumber premises with Products and materials.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.6 CONSTRUCTION PARKING

.1 Contractor and Subcontractors to make own arrangements for parking. For on site parking, payment of daily posted parking rates is required.

1.7 SECURITY

.1 Contractor is responsible for the security and protection of its Products, materials, tools, equipment, and other items brought to the site for performance of the Work.

.2 Perimeter fencing shall be provided by Contractor for the protection of the general public.

.3 Ensure proposed hoarding, with branding if applicable, is submitted with the Client for approval.

1.8 OFFICES

.1 General meetings involving various parties shall be held at the offices of the Client.

.2 General meetings involving various parties shall be held at the offices of the Client.

.3 A site trailer for the use of the Contractor, formwork trade, and M&E trades will be on site. No other facilities on site shall be provided.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof enclosures as required for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof enclosures on site in manner to cause least interference with work activities, and at direction of Client.

1.10 SANITARY FACILITIES

.1 Contractor shall provide sanitary facilities.

.2 Permanent facilities shall not be used.

.3 Proposed location of sanitary facilities to be approved by the Client.

1.11 CONSTRUCTION SIGNAGE

.1 Client shall provide general safety signs. Each subcontractor shall provide and maintain their own safety signs as required for their work. No advertising, company identification, or promotional signs permitted.

.2 Maintain approved signs and notices in good condition for duration of work, and dispose of off site on completion, or earlier if directed by Client or Consultant.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide measures for protection and diversion of traffic related to Work, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and Work, and erection and maintenance of adequate warning, danger, and directional signs.

.2 Protect travelling public from damage to person and/or property.

.3 Interfere as little as possible with public vehicular and/or pedestrian traffic.

.4 Verify adequacy of existing roads and allowable load limit on these roads. Repair damage to roads caused by Work at own expense.

1.13 DAILY CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

END OF SECTION

Part 1 General

1.1 CONSTRUCTION PHASING PLAN

.1 Provide Construction Phasing Plan complete with diagrams to communicate project phasing and temporary construction as required to complete the Work. Coordinate with Construction Schedule.

.2 Submit Phasing Plan for Consultant and Client review prior to commencement of Work.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls as required in order to expedite Work.

.2 Remove from site all such Work after use.

1.3 HOARDING

.1 Fencing and Siltation Controls: in accordance with regulations of Authority Having Jurisdiction regulations, by-laws and ordinances.

.2 Erect temporary site enclosure using purpose-made, prefabricated interlocking metal fence panels, minimum 2.1 m high. Perimeter fencing shall be structurally adequate and designed and installed to prevent children and adults from accessing the worksite.

.1 Have lightning grounding protection designed by a Professional Engineer (P.Eng.) licenced to practice in Ontario and install as designed.

.3 Provide two lockable truck entrance gates and at least one pedestrian entrance as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.5 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stairwells, open edges of floors and roofs.

.2 Provide as required by authorities having jurisdiction.

1.5 WEATHER ENCLOSURES

.1 Provide weathertight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

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

.3 Design enclosures to withstand wind pressure and snow loading.

.4 Construct and provide weather protection as necessary to prevent water, ice and snow from entering wall systems during construction.

1.6 DUST TIGHT SCREENS

.1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work, and public.

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

1.7 ACCESS TO SITE

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

1.8 PUBLIC TRAFFIC FLOW

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

1.9 FIRE ROUTES

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

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.11 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Consultant locations and installation schedule 3 days prior to installation.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards.

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

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

.4 Cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

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

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

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

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

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

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

1.3 AVAILABILITY

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

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

1.4 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

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

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

1.5 TRANSPORTATION

.1 Contractor shall pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions.

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

1.7 QUALITY OF WORK

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

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

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

1.8 COORDINATION

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

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

1.9 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Consultant if there is interference. Install as directed by Consultant.

1.10 REMEDIAL WORK

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

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

1.11 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Locate for ease and efficiency of post-occupancy maintenance, exact locations determined by Consultant.

.3 Inform Consultant of installation interferences and/or conflict. Install as directed.

1.12 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Consultant.

1.15 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by authorities having jurisdiction, with minimum of disturbance to Work, and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered that are not to be incorporated into the Project as active services or service neighboring properties, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

1.1 DEFINITIONS

.1 Acceptable Materials: The term ‘Acceptable Materials’ (or ‘Acceptable materials’) is used to specify products by trade name, manufacturer, catalogue number, model number, or similar reference, and is used within the Project Manual as follows:

.1 Acceptable Materials listings are based on Consultant’s determination that materials meet specified requirements and opinion of applicability to the project requirements.

.2 Acceptable Materials listings are deemed to establish the standard of acceptance that Consultant will consider appropriate for the Work.

.3 Any product listed in the Acceptable Materials listing may be used to establish the Bid Price.

.2 Basis-of-Design: The term ‘Basis-of-Design’ is used to specify a specific material name, manufacturer, catalogue number, model number or similar reference and is used as follows:

.1 Basis-of-Design product selections shall establish the minimum criteria for acceptance. Any product submitted as a substitution or alternate must at the very least match or exceed the physical properties and performance characteristics of the basis-of-design product. The onus of proof lies with the Contractor who must submit ample evidence of compliance with these criteria; any application for a substitution or alternate may be rejected by the Owner and/or Consultant at their sole discretion without explanation.

.2 Basis-of-Design product selections are used to establish Consultant’s preference for a single source product listing based on performance, physical properties, appearance, warranty, and/or configuration.

.3 Use the Basis-of-Design product selections to establish the Bid Price unless an Addendum is issued adding additional Acceptable Materials or approving an Alternate product.

.4 Schedules or labels on the Drawings that indicate materials or products by proprietary name or manufacturer, and possibly also listing a specific colour or finish, are Basis-of-Design, and subject to the requirements of this specification Section 01 62 00.

.3 Standard of Acceptance: ‘Standard of Acceptance’ means ‘Basis-of-Design’.

.4 Non-proprietary specification means a specification that includes descriptive, reference standard or performance requirements, or any combination thereof, but does not include proprietary names of products or manufacturers.

.5 Substitution means a proposal from Contractor to provide a product, material, or item of equipment not specified in the Contract documents but functionally equivalent and readily exchangeable to a specified item; for consideration by Client and Consultant.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 When requested by Client and/or Consultant, submit complete data substantiating compliance of a product with requirements of Contract Documents. Include the following:

.1 Product identification, including manufacturer's name and address.

.2 Written verification that the substitute products can be obtained, meet the performance required for the project, and meet requirements of the Building Code.

.3 Manufacturer's literature providing product description, applicable reference standards, and performance and test data.

.4 Samples, as applicable.

.5 Name and address of projects on which product has been used and date of each installation.

.6 For substitutions and requests for changes to accepted products, include in addition to the above, the following:

.1 Itemized comparison of substitution with named product(s). List significant variations.

.2 Designation of availability of maintenance services and sources of replacement materials.

1.3 PRODUCT OPTIONS

.1 For products specified by non-proprietary specification:

.1 Select any product, assembly, or material that meets or exceeds the specified standards for products specified only by referenced standards and performance criteria.

.2 Acceptable Materials: Select any named product, assembly, or material contained in the listing of Acceptable Materials.

.3 Basis-of-Design: Use the named product contained in the Basis-of-Design listing, unless an addendum is issued indicating acceptance of additional Acceptable Materials.

1.4 SUBSTITUTIONS

.1 Contractor will assemble requests for substitutions requested by subcontractors and submit to Consultant and Client for review.

.2 Consultant and Client will review proposed substitute products for acceptability only when submitted by Contractor; Consultant or Client will not review requests submitted independently by subcontractors.

.3 No substitutions will be permitted without Consultant and Client’s written acceptance; Contractor will be required to remove products and replace with specified materials or provide a credit to the value of the contract at Consultant and Client’s joint discretion where substitutions are found in the Work that have not been formally accepted by Consultant and Client.

.4 Consultant and Client are not obliged to accept any Proposed Substitution offered by Contractor, and reserves the right to dismiss any item with no further explanation.

.5 Substitute Products: Where substitute products are permitted, unnamed products may be accepted by Consultant, subject to the following:

.1 Substitute products shall be the same type as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the named product(s). Substitutions shall not require revisions to Contract Documents nor to work of Other Contractors.

.6 Substitute Manufacturers: Where substitute manufacturers are permitted, unnamed manufacturers may be accepted by Consultant, subject to the following:

.1 Substitute manufacturers shall have capabilities comparable to those of the named manufacturer(s). Substitutions shall not require revisions to Contract Documents nor to work of Other Contractors.

.7 In making a proposal for substitution the Contractor represents:

.1 That they have investigated the proposal and (unless the proposal explicitly states otherwise) determined that it performs in a similar way or is superior to the product or method specified, and does not have a negative impact on other trades.

.2 That the same guarantee / warranty will be furnished as for the originally specified product or construction method.

.3 That they will coordinate installation of the accepted substitute into the Work, making such changes in the Work as may be required to accommodate the change.

.4 That they will bear costs and waives claims for additional compensation for costs and time that subsequently become apparent arising out of the substitution.

END OF SECTION

1.1 REFERENCES

.1 Owner's identification of existing survey control points and property limit.

1.2 QUALIFICATIONS OF SURVEYOR

.1 Contractor shall contract the services of an Ontario Land Surveyor (OLS) licensed to practice in Ontario and acceptable to Consultant

.2 Surveyor shall be a member in good standing of The Association of Ontario Land Surveyors and have a current Certificate of Authorization.

1.3 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Consultant.

.4 Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require Surveyor to replace control points in accordance with original survey control.

1.4 SURVEY REQUIREMENTS

.1 Establish two permanent bench marks on site, referenced to established benchmarks by survey control points. Record locations, with horizontal and vertical data, in Project record and as-built documents.

.2 Establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading, fill and topsoil placement and landscaping features.

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

.6 Stake batter boards for foundations.

.7 Establish foundation column locations and floor elevations.

.8 Establish lines and levels for mechanical and electrical work.

1.5 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Owner and Consultant of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

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

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

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

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

1.7 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

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

1.8 SURVEYOR'S REAL PROPERTY REPORT (SRPR)

.1 At Substantial Performance have Surveyor complete and certify a Real Property Report and submit original to Owner with copy to Consultant.

.2 Submit an electronic copy of SRPR to Owner and Consultant on CD or DVD in AutoCAD and SketchUp formats.

1.9 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Surveyor to Consultant.

.2 On request of Consultant, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting elevations and locations of completed as-built Work, identifying elements not in conformance with Contract Documents.

.4 Submit final as-built survey on CD or DVD in AutoCAD and SketchUp formats.

1.10 SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

END OF SECTION

1.1 SUBMITTALS

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

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

.2 Include in request:

- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Contractor.
- .7 Written permission of Client.
- .8 Date and time work will be executed.

1.2 PREPARATION

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

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

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

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

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

1.3 EXECUTION

.1 Execute cutting, fitting, and patching, including excavation and fill, to complete Work as required during the progress of the Work.

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

.3 Uncover Work to install ill-timed Work.

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

.5 Remove samples of installed Work for testing.

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

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

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

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

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

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

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

.13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing the entire unit.

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

END OF SECTION

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use marked separate bins for recycling.

.7 Dispose of waste materials and debris off site.

.8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

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

1.2 FINAL CLEANING

.1 Clean work prior to final review by Consultant.

.2 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.3 Remove waste as specified.

.4 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.5 Prior to final review remove surplus products, tools, construction machinery and equipment.

.6 Subcontractors shall remove waste products and debris created by their own Work.

.7 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.

.8 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.9 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.10 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

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

.12 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.13 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.14 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.15 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.16 Remove dirt and other disfiguration from exterior surfaces.

.17 Clean and sweep roofs, gutters, areaways, and sunken wells.

.18 Sweep and wash clean paved areas.

.19 Clean equipment and fixtures to sanitary condition.

.20 Clean mechanical equipment including replacement of filters.

.21 Clean roofs, downspouts, and drainage systems.

.22 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.23 Remove snow and ice from access to building.

END OF SECTION

1 CONSTRUCTION WASTE MANAGEMENT PLAN

.1 Provide the following submittals to the requirements of Section 01 33 00 - Submittal Procedures:

.2 Construction Waste Management Plan (CWMP):

.1 It is the intent of this specification to maximize the diversion of demolition and construction waste from landfill disposal. Prior to the generation of any waste, prepare and submit a Construction Waste Management Plan describing:

.1 Material category

.2 Generation point of waste

.3 Total quantity of waste in tons

.4 Quantity of waste salvaged, both estimated and actual in tons

.5 Quantity of waste recycled, both estimated and actual in tons

.6 Total quantity of waste recovered (salvaged plus recycled) in tons

.7 Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste

.8 Include up-to-date records of donations, sales, recycling and landfill / incinerator manifests, weight tickets, hauling receipts, and invoices.

.2 Prior to the generation of any waste, prepare and submit a Construction Waste Management Plan for including, but not limited to, the following:

.1 Site Waste:

.1 Asphaltic concrete paving
.2 Concrete
.3 Ballasts

.2 Demolition Waste:

.1 Hazardous Waste
.2 Concrete reinforcing steel
.3 Brick / Concrete masonry units
.4 Wood studs / joists / paneling / trim / plywood / OSB
.5 Structural and miscellaneous steel
.6 Roofing
.7 Insulation
.8 Door panels / frames / hardware
.9 Windows / glazing
.10 Metal studs
.11 Gypsum board / Acoustical tile & panels
.12 Carpet / Carpet pad
.13 Demountable partitions
.14 Equipment
.15 Cabinets
.16 Plumbing fixtures
.17 Piping
.18 Supports and hangers
.19 Valves / Sprinklers

.20 Mechanical equipment
.21 Refrigerants
.22 Electrical conduit / Copper wiring
.23 Lighting fixtures
.24 Electrical devices
.25 Switchgear and panelboards
.26 Transformers

.3 Construction Waste:

.1 Masonry and CMU
.2 All untreated wood, including lumber and finish materials
.3 Wood sheet materials & trim
.4 Metals
.5 Roofing
.6 Insulation
.7 Carpet and pad
.8 Gypsum board
.9 Unused (leftover) paint
.10 Piping
.11 Electrical conduit
.12 Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
.1 Paper
.2 Cardboard
.3 Boxes
.4 Plastic sheet and film
.5 Polystyrene packaging
.6 Wood crates
.7 Plastic pails
.13 Beverage and packaged food containers

.3 Divert a minimum of 75% (by weight) of construction and demolition waste from landfill disposal, including waste resulting from demolition of any existing building elements and site materials scheduled for demolition; any site paving is required to be ground on site and reused as granulated fill on site.

.4 Approval of the Contractor's CWMP shall not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

2 WASTE MANAGEMENT REQUIREMENTS

.1 Construction Waste Management Requirements: comply with Province of Ontario and municipal requirements for construction waste diversion, transportation and management.

.2 Reduce solid waste produced by Work in accordance with CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

.3 Comply with Ontario Ministry of the Environment Regulations 102/94 and 103/94.

3 STORAGE, HANDLING AND PROTECTION

.1 Store materials to be reused, recycled and salvaged in locations as directed by Consultant.

.2 Unless specified or indicated on Drawings otherwise, materials for removal become Construction Manager's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Consultant.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
- .1 On-site source separation is recommended.
- .2 Remove comingled materials to off-site processing facility for separation.
- .3 Provide waybills for separated materials.

4 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, and paint thinner into waterways, storm, or sanitary sewers.

.3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

5 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by existing facility, and also provide temporary security measures approved by Consultant when required to assure continuity of security.

6 SCHEDULING

.1 Coordinate waste management activities with other activities at site to ensure timely and orderly progress of Work, and lawful collection, transportation, recycling and disposal and construction/demolition waste product.

7 APPLICATION

.1 Handle waste materials not reused, salvaged, or recycled in accordance with governing regulations and codes.

8 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

1.1 INSPECTION AND DECLARATION

.1 Client's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Consultant in writing of satisfactory completion of Client's inspection and that corrections have been made.

.2 Request Consultant's review.

.3 Consultant's Review: Consultant will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.2 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Certificates required by Boiler Inspection Branch, Fire Commissioner, and Utility companies have been submitted.

.5 Operation of systems have been demonstrated to Client's personnel.

.6 Work is complete and ready for final inspection.

.3 Final Review: when items noted above are completed, request final inspection of Work by Client, Consultant, and Contractor. If Work is deemed incomplete by Client and Consultant, complete outstanding items and request re-inspection.

.4 Declaration of Substantial Performance: when Client and Consultant consider that deficiencies and defects have been corrected, and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

.5 Commencement of Lien and Warranty Periods: shall be in compliance with Construction Lien Act, R.S.O. 1990, c. C.30 and R.R.O. 1990, Reg. 175: GENERAL; date of Owner's acceptance of published declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by Ontario Construction Lien Act.

.6 Final Payment: when Client and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Client and Consultant, complete outstanding items and request re-inspection.

.7 Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback.

1.2 CLOSEOUT PROCEDURES

.1 Comply with the recommendations of "A Guide to Project Closeout Procedures, November 2010", published by Ontario Association of Architects and Ontario General Contractors Association.

1.3 CLEANING

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

.2 Remove waste and surplus materials, rubbish, tools, equipment, and temporary construction facilities from the site, and dispose offsite in accordance with local by-laws and ordinances, and the requirements of Section 01 74 19 – Waste Management and Disposal.

END OF SECTION

1.1 GENERAL

.1 The procedures for completing Contract and acceptance by the Owner shall be in accordance with the methods described in OAA/OGCA Document 100 (Latest Edition) and any additional requirements described herein.

.2 Stages will be reviewed at the Contract start-up meeting to ensure that parties understand their responsibilities. Refer to Section 01 31 19 for procedures and requirements for Contract start-up meeting.

.3 Submit to the Consultant a list of closeout submittals required by the Contract Documents.

1.2 CLOSEOUT SUBMITTALS

.1 Collect reviewed submittals, and assemble required closeout submittals executed by Subcontractors, Suppliers, and manufacturers. Prior to submitting closeout submittals to the Consultant, undertake the following:

.1 Review maintenance manual contents (operating, maintenance instructions, as-built drawings, materials) for completeness.

.2 Review supply and completeness of spare parts required by Contract Documents and manufacturers.

.3 Review change orders, holdbacks and other adjustments to the Contract.

.4 Review inspection and testing reports to verify conformance to intent of Contract Documents and that changes, repairs or replacements have been completed.

.5 Submit a final statement of accounting giving total adjustments to the Contract, previous payments, and monies remaining at time of application for completion of the Contract. Consultant will issue a final change order reflecting approved adjustments to Contract Price not previously made.

.2 No later than 10 Working Days prior to submitting request for Consultant's review to determine if Substantial Performance of the Work has been achieved, submit to the Consultant the closeout submittals specified in this section, including an electronic and hard copy binder with the following at a minimum, but not limited to:

.1 Cover page
.2 Table of contents
.3 Reviewed shop drawings
.4 Product data sheets
.5 Samples
.6 As-built drawings (by Contractor)
.7 Record Drawings (by Consultant)
.8 Operation and Maintenance Manuals.
.9 Reports recording demonstration and instruction provided to Owner for operation and maintenance of building systems
.10 Software required for operation and maintenance of building systems
.11 Maintenance materials, and keys
.12 Identify any components of the work requiring re-occurring maintenance or early replacement (filters, batteries, etc.) so that our Facilities group can plan ahead.
.13 Training attendance list (to be created and maintained by contractor)
.14 Final Deficiency list (by Consultant)
.15 Certificate of Substantial performance
.16 Certificate of Publication in daily commercial news
.17 Identification of any extended product warranties, or limited service / maintenance agreements.

.18 Fully executed warranties and guarantees
.19 Transmittal letter for spare parts, surrendered to owner
.20 Reviewed field reports and verification reports
.21 Occupancy letter, closed permit if required.

.3 For equipment put into use with Owner's permission during the Work, submit required closeout submittals within 10 Working Days after start-up.

.4 For items of the Work delayed materially beyond date of Substantial Performance of the Work, provide updated closeout submittals within 10 Working Days after acceptance, listing date of acceptance as start of warranty period.

.5 Neither the Consultant's review to determine if Substantial Performance of the Work has been achieved, nor acceptance of the Work, will take place until receipt, by the Consultant, of acceptable copies of the closeout submittals required herein and by the Contract Documents.

.6 Record documents:

.1 Consultant will provide one (1) set of full-size prints of Contract Documents to the Contractor for the purpose of recording as-built conditions.

.2 Accurately record changes to the Work and deviations from Contract Documents as the Work progresses.

.3 Mark changes in red ink.

.4 Record, without being limited to, the following:

.1 Survey of as-built conditions and survey logs prepared by the registered land surveyor responsible for setting out the work and field engineering.

.2 Depths of various elements of foundation in relation to survey datum.

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

.4 Other underground installations and services set beneath slabs-on-grade referenced to visible and accessible features of structure.

.5 'AS-BUILT' elevations of paving, sidewalks, manholes and catch basins.

.6 Field changes of dimensions/details.

.7 Changes by change order/change directive/supplemental instructions.

.8 Locations of interior mechanical and electrical equipment and distribution.

.9 Elevations and location depths of services. Identify type and size of service and materials used.

.10 As-built specifications manuals: Record as-built Products, including manufacturer, manufacturer's model or system number and finish / finish system.

.5 Consultant to provide to Contractor prior to substantial performance an electronic copy of the mechanical and electrical drawings on disk for the Contractor's use in their preparation of electronic copy of record drawings. The mechanical and electrical site services drawings have been prepared using Revit (2014 Version) and may be converted to AutoCAD for purposes of record documents.

.6 Submit 1-complete final set of record documents of all contract drawings (full size prints) as well as electronic coy (on disk) of site services, mechanical and electrical drawings.

.7 Posted operating instructions:

.1 Prepare operating instructions in English for posting near equipment and systems. Posted instructions to be glass covered, framed and mounted.

.2 Posted instructions to consist of simplified, consolidated equipment, control and power diagrams graphically representing the entire system, including concise instructions on how to start and stop systems, what settings and conditions are to be observed by the operators, and what control adjustments are to be made or maintained by the operator.

.3 Posted instructions shall include control diagrams with added specific operating instructions, controls, interlocks, etc.

.4 Posted instructions shall include:

.1 HVAC controls for each system;

.2 One-line schematic diagrams of water supply;

.3 One-line isometric diagrams of sanitary drainage;

.4 One-line diagrams of steam distribution, hot and cold water systems, including risers, valves, control devices, etc.

.8 Operation and maintenance manuals:

.1 Submit 3 bound copies and one (1) PDF copy on CD/R of maintenance manuals, consisting of the following general components:

.1 Shop drawing manuals,

.2 Warranty manuals, and

.3 Project data book

.2 Operation and maintenance manuals shall contain operating and maintenance data and information specified below for supplied Products, in English, and shall be made up as follows:

.1 Bind each general component of the operation and maintenance manuals in separate vinyl hard covered, 3 ring loose leaf binders for 213 mm x 275 mm (8 1/2" x 11") size paper.

.2 Enclose title sheet, labelled as applicable, with project name, date and list of contents.

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

.4 Neatly type lists and notes. Use clear drawings, diagrams of manufacturers' literature.

.3 Shop drawing manuals:

.1 Submit one copy of each final accepted shop drawing issued for the Work on that have recorded changes made during fabrication and installation caused by unforeseen conditions.

.4 Warranty manuals:

.1 Submit copies guarantees, warranties and extended warranties together in one report binder, complete with an indexed summary list of warranties and expiration dates. Warranties to be in accordance with Contract.

.5 Project data book: shall include the following information supplemented by additional required data specified elsewhere in the Contract Documents:

.1 Maintenance instruction for finished surfaces and materials.

.2 Copy of hardware and paint schedules.

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

.6 Names, addresses and phone numbers of Subcontractors and Suppliers, as applicable.

.7 Additional material used in the Work listed under various sections showing name of manufacturer and source of supply.

.8 Charts, diagrams and reports identified in Divisions 15 and 16 of the specifications.

.9 Report recording demonstration and instruction provided to Owner's personnel for operation and maintenance of building systems as described below in this section.

.1 Permits and forms:

.1 Occupancy permit; statutory declarations.

.2 Workplace Safety & Insurance Board certificate of clearance.

.3 Certificates of approval of the Work by local building department (if available).

.4 Electrical authority certificate of inspection.

.5 Elevator authority certificate of approval.

.9 Maintenance materials:

.1 Provide overage, extra stock, and maintenance materials. For required materials, see individual sections of specifications. Deliver to a location and at a time specified by the Owner.

.2 Use unbroken cartons, or if not supplied in cartons, material shall be strongly packaged.

.3 Clearly mark cartons or packaging as to contents, project name, and Supplier.

.4 If applicable give colour and finish, room number or area where material is used.

.5 Replace incorrect or damaged maintenance materials delivered to Owner, including damage through shipment.

.6 Provide a typed inventory list of maintenance materials prior to Substantial Performance of the Work application. List all items, complete with quantities, and storage locations.

.7 Establish a master list identifying maintenance materials and maintain a log of when materials are turned over to Owner and signing authority for acceptance of materials on behalf of Owner.

1.3 SYSTEM DEMONSTRATION AND PROJECT COMMISSIONING

.1 Comply with the requirements of Section 01 91 10 - Commissioning and Section 01 79 00 - Demonstration and Training.

.2 Refer to requirements of other Divisions for additional requirements related to demonstration and commissioning for site services, elevators, mechanical systems, and electrical systems.

.3 Perform system demonstration and commissioning work no later than 10 Working Days prior to submitting request for Consultant's review to determine if Substantial Performance of the Work has been achieved.

.4 Submit required certificates of approval or acceptance from authorities having jurisdiction.

.5 Meet with other consultants, including structural, mechanical, electrical, to coordinate demonstration, instruction, commissioning and completion.

.6 Review condition of equipment such as lighting, elevators and heating system, which has been used in the course of the Work to ensure turning over at completion in "as new condition" with warranties dated and certified from time specified.

.7 When partial occupancy of uncompleted project is required by Owner, coordinate Owner's uses, requirements, access, and the like, with Contractor's requirements to complete the Work.

.8 Demonstration and Instruction:

.1 Demonstrate operation of each system to Owner.

.2 Instruct Owner's personnel in operation, adjustment and maintenance of equipment and systems, using operation and maintenance data provided as the basis for instructions. Arrange and coordinate instruction of Owner's staff in care, maintenance and operation of building systems and finishes by Suppliers and Subcontractors.

.3 Contractor, manufacturer's representatives, and responsible personnel from Subcontractors whose work is being demonstrated shall be present at these demonstrations.

.4 Instruct Owner's representative on use of software required for operation and maintenance of building systems and provide a toll-free telephone number or website address for further assistance to the Owner.

.5 Prepare and insert additional data in the operation and maintenance data manuals when the need for additional data becomes apparent during demonstration or instruction.

.6 Demonstration and instruction report: Submit a written report of such demonstration, instruction, and commissioning to the Consultant as part of the contract closeout submittals described earlier in this section. Report shall include time and date of each demonstration, instruction, and commissioning activity, complete with a list of persons present.

.9 Correct deficiencies and defects identified during demonstration, instruction, or commissioning.

.10 Attend 'end-of-work' testing and break-in or start-up demonstration.

1.4 SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Deficiency review:

.1 Neither Owner nor Consultant will be responsible for preparation or issuance of extensive lists of deficiencies. Contractor assumes prime responsibility for ensuring that items shown and described in the Contract Documents are complete. Any reviews to approve the certificate of Substantial Performance of the Work will be immediately cancelled if it becomes obvious to the Consultant that extensive deficiencies are outstanding.

.2 The Contractor shall conduct an inspection of the Work to identify deficiencies and defects, which shall be repaired. When the Contractor considers that the Work is substantially performed, the Contractor shall prepare and submit to the Consultant a comprehensive list of items to be completed or corrected and apply for a review of the Work by the Consultant to determine if Substantial Performance of the Work has been achieved.

.3 The Contractor's request described above shall include a statement by Contractor that the Work to be reviewed by Consultant for deficiencies is, to the best of the Contractor's knowledge, in compliance with Contract Documents, reviewed shop drawings, and samples, and that deficiencies and defects previously noted by Consultant have been repaired.

.4 No later than 10 Working Days after the receipt of the Contractor's request described above, but contingent upon the prior receipt, by the Consultant, of the closeout submittals in the manner and form specified in this section, the Consultant and the Contractor will review the Work to identify any defects or deficiencies. If necessary, the Contractor shall tabulate a list of deficiencies to be corrected prior to Substantial Performance of the Work being certified by the Consultant. During review, the Consultant and the Contractor will decide which deficiencies or defects must be rectified before Substantial Performance of the Work can be certified, and which defects are to be treated as warranty items.

.5 Provide a schedule of planned deficiency review having regard to the foregoing.

.2 Certification of Substantial Performance of the Work:

.1 When the Consultant considers that the deficiencies and defects have been completed and that it appears that the requirements of the Contract Documents have been substantially performed, the Consultant shall issue a certificate of Substantial Performance of the Work to the Contractor, stating the date of Substantial Performance of the Work.

.2 Commencement of Lien and Warranty Periods: shall follow Construction Lien Act, R.S.O. 1990, c. C.30 and R.R.O. 1990, Reg. 175: GENERAL; date of Owner's acceptance of published declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by Ontario Construction Lien Act.

.3 Final Inspection for completion of the Contract:

.1 Deficiencies and defects shall be made good before the Contractor submits a written request for final review of the Work and before the Contract is considered complete.

.2 When Contractor is satisfied that the Work is complete, and after the Contractor has reviewed the Substantial Performance of the Work to verify its completion in accordance with the requirements of the Contract Documents, the Contractor shall submit a written request for a final review by the Consultant, who in turn will notify the Owner.

.3 If there are any deficiencies identified as a result of this review, they shall be listed by the Consultant and submitted to the Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the Work under the Contract.

.4 Such deficiencies shall be corrected by a date mutually agreed upon between Consultant and the Contractor, unless a specific date is required by Contract, and a further review by the Consultant shall be called for by the Contractor following his own review to take place within 7 days from date of request.

.5 Contractor shall thereafter submit invoice for final payment.

.6 Money shall be withheld for deficiency work and will be released only when all deficiencies have been completed. No partial payment to be recognized until all work is completed.

.7 Return Project documentation to Owner at completion of the Contract.

1.5 WARRANTY PERIOD

.1 At the beginning of the 12th month after Substantial Performance of the Work, the Owner, Contractor and Consultant, along with key Subcontractors as designated, shall carry out a complete review of building and its systems to determine which deficiencies are to be rectified under the warranty. Contractor shall be responsible for timely written notification of Owner and Consultant prior to such end of warranty period inspection and any delay in such notification shall extend such warranty period until proper notification is received by Owner and Consultant.

END OF SECTION

1.1 DESCRIPTION

.1 Demonstrate scheduled operation and maintenance of equipment and systems to designated personnel 10 days prior to date of Substantial Performance.

.2 Identify equipment to be demonstrated.

.3 A list of personnel to receive instructions will be provided, and their attendance coordinated at mutually agreed-upon times.

.4 Provide a make-up day for Demonstration if required.

1.2 QUALITY CONTROL

.1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct designated personnel, and provide written report that demonstration and instructions have been completed.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system 10 days prior to agreed dates for Consultant's approval.

.2 Submit reports within 5 days after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.3 Give time and date of each demonstration, with list of persons present.

1.4 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation.

.2 Testing, adjusting, and balancing has been performed, and equipment and systems are fully operational.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.5 PREPARATION

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.6 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

1.7 TIME ALLOCATED FOR INSTRUCTIONS

.1 Provide trained personnel to instruct operating staff on maintenance, adjustment and operation of mechanical equipment. Instruct staff on changes or modification in equipment made under terms of guarantee.

.2 Provide instruction during regular work hours prior to acceptance and turnover to operating staff for regular operation.

.3 Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn one manual over to chief operating engineer, the balance to Consultant.

.4 Time allocated for Instruction:

.1 Overhead Coiling Doors: 1-hour.

.2 Sectional Metal Doors: 1-hour.

.3 Operable Windows: 1-hour.

.4 Balcony Doors: 1-hour.

.5 Doors with automatic operators: 1-hour.

.6 Finishes (floor, wall, ceiling): ½-hour per finish.

.7 Division 10 - Specialties: ½ hour each for toilet partitions, toilet and bath accessories, lockers, mailboxes.

.8 Facility Fall Protection: 1-hour.

.9 Trees, Shrubs & Ground Covers: 1-hour.

.10 Pumps: 1-hour instruction.

.11 Tanks: 1-hour instruction.

.12 Plumbing: 2-hours instruction.

.13 Chemical: 1-hour instruction plus monthly visits.

.14 Fire Protection: 1-hour instruction.

.15 Boilers: 1-hour instruction.

.16 Glycol: ½-hour instruction.

.17 Air Handling: 1-hour instruction.

.18 Pool equipment and servicing: 40 hours (overall) instruction and support as required during the first year following certificate of Substantial Performance.

.19 Controls: 40 hours (overall) instruction and support as required during the first year following certificate of Substantial Performance.

.20 Elevators: 40 hours (overall) instruction and support as required during the first year following certificate of Substantial Performance.

END OF SECTION

1.1 RELATED REQUIREMENTS

.1 Refer to and coordinate with electrical and mechanical Drawings and Specifications.

.2 Include commissioning of relocated and new equipment.

1.2 DEFINITIONS

.1 Commissioning: A quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems and assemblies meets defined objectives and criteria. Subsystem, system and intersystem 'Operational and Functional Performance Testing' must not be scheduled until the Contractor has successfully completed the 'Start up and Testing Process' and a 'Certificate of Readiness' is submitted and reviewed by Consultant.

.2 Functional Performance Testing: The testing of the systems and subsystems to verify they are ready for occupancy and operation, and functioning correctly in accordance with the Contract Documents, including correct interaction between equipment, systems and subsystems. The range of checks and tests to verify all systems, subsystems and interfaces between them, operate in accordance with the Contract Documents. In this context 'operate' includes all modes and sequences of control operation, operating set points, interlocks and conditional control responses, and specified responses to emergency conditions. Functional Performance Testing occurs after the successful completion of Operational Performance Testing.

.3 Integrated System Tests: Testing to demonstrate that each system is operating in concert with every other system according to the documented design intent and Contract Documents.

.4 Operational Performance Testing: The testing of the components, equipment, systems or subsystems to verify they have been checked and started up in accordance with the Contract Documents, manufacturer's written instructions and other codes and standards. The range of checks and tests to verify all systems, subsystems and interfaces between them, operate in accordance with the Contract Documents. In this context 'operate' includes all modes and sequences of control operation, interlocks and conditional control responses, and specified responses to emergency conditions. Operational Performance Testing occurs before Functional Performance Testing.

.5 Start-up and Testing Process: This process shall verify that all systems and subsystems forming part of the Work operate in accordance with the Contract Documents, via the successful execution of the Operational and Functional Performance Testing. The Start-up and Testing Process is conducted by the Contractor, with the support of the Subcontractor and the associated factory authorized and trained personnel and is one of the prerequisites to Commissioning. Consultant may elect to witness this testing. Upon successful completion of the Start-up and Testing Process of each system or subsystem, submit a Certificate of Readiness to Consultant.

.6 Subsystem: Fabricated components, equipment or smaller systems forming part of a larger System.

.7 System: Group of interacting equipment or Subsystems forming a System.

1.3 REFERENCES

.1 Contractor shall plan, schedule, coordinate and execute the commissioning of each item of Equipment and building systems forming part of the Work in accordance with the following minimum standards:

.1 ANSI/ASHRAE/IES Standard 202-2013, Commissioning Process for Building and Systems.

.2 ASHRAE Guideline 0-2013, The Commissioning Process.

.3 ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process.

.4 ASHRAE Guideline 1.4-2014, Procedures for Preparing Facility Systems Manuals.

.5 ASHRAE Guideline 1.5-2017, The Commissioning Process for Smoke Control Systems.

.6 ASHRAE Guideline 11-2009, Field Testing of HVAC Controls Components.

.7 ASHRAE Guideline 4-2008 (RA-2013), Preparation of Operating and Maintenance Documentation for Building Systems.

.8 ASHRAE Handbook, 2015 edition.

.1 HVAC Applications Chapter 43 HVAC Commissioning.

.9 CAN/ULC S1001-11, Integrated Systems Testing of Fire Protection and Life Safety Systems.

.10 CSA C282-15, Emergency electrical power supply for buildings.

.11 CSA Z32-15, Electrical safety and essential electrical systems in health care facilities.

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

.13 CSA Z320-11(R2016), Building commissioning, Includes Update No. 1 (2011).

.14 CSA Z8000-11(R2016), Canadian health care facilities, Includes Update No. 1 (2013).

.15 CSZ Z8001-13, Commissioning of health care facilities.

.16 CSA Z8002-14, Operation and maintenance of health care facilities.

.17 NFPA (FIRE) 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, 2016 Edition.

.2 CSA Z320 shall govern the commissioning process. The requirements of the other standards shall be additive to CSA Z320.

1.4 COMMISSIONING SCOPE

.1 Commission Systems and Subsystems in accordance with the requirements of the Contract Documents.

.2 Commissioning during the construction phase is intended to achieve the following specific objectives:

.1 Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry-accepted minimum standards, and that they receive adequate operational checkout by installing contractors.

.2 Verify and document proper performance of equipment and systems.

.3 Verify that O&M documentation is complete.

.4 Verify that operating personnel are adequately trained.

.3 The Contractor assists in the Commissioning process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems shall be operated at full capacity under various modes to determine if they function correctly and consistently at peak performance and efficiency. Systems shall be interactively tested with each other as intended in accordance with Contract Documents and design criteria.

.2 During these checks, adjustments shall be made to enhance performance to meet environmental or user requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit the following documents to Consultant for review in accordance with the requirements of Sections 01 33 00:

.1 'Commissioning Plan': Description of overall Commissioning process for each System, combinations of Systems, or Subsystems.

.1 The 'Commissioning Plan' shall include, but not be limited to, the following:

.1 Description of all planned activities for individual Systems and System interfaces. The Plan shall also include all activities for Integrated Systems Tests.

.2 Objective of each test or series of tests.

.3 Testing schedule.

.4 Schedule for delivery of Commissioning Procedures.

.2 Commissioning Procedures: detailed written test procedures required to perform the Operational and Functional Performance Testing through the use of simulated normal, alarm and emergency conditions, as required, in order to demonstrate each System, combinations of Systems or Subsystems, and interfaces between Systems, operate in accordance with the Contract Documents.

.1 Provide a test procedure for each function to be tested, for each System, Subsystem and combination of Systems. Procedures shall include, at minimum, specific tests identified in the technical Specifications. The procedure shall describe the individual test and steps comprising each test, particularly methods and processes to follow. Each test procedure shall include the following items:

.1 Name of the System(s) or Subsystem(s) and of function(s) to be tested.

.2 List of tests to be performed and a description of the purpose of each test, including drawings, sketches and a list of completed prerequisite tests fully completed.

.3 Setup and conditions for each test, including descriptions of the test equipment.

.4 Step-by-step descriptions of each test, including but not limited to, inputs and user actions for each step, detailed review of control sequences, and set points.

.5 Expected results for each test, including pass-fail criteria. Provide detailed checklists with space for check-off fields to ensure criteria passed.

.6 Test forms which shall include the records of test data, including the name of the person and company performing the test, test type and date, equipment used and test results. The test forms shall be signed by all attendees.

.7 Line for signature and date for the Contractor to witness the test successfully completed.

.8 Estimated duration of each test.

.9 List of Contractor's attendees, and responsibility of each party.

.3 Certificate of Readiness: A document stating the individual System, combination of Systems, and Subsystems has successfully completed the Start-up and Testing Process and is ready for Commissioning. Submit six copies of the Certificate of Readiness form (sample attached) for each System or Subsystem scheduled to be Commissioned or re-Commissioned, including attachments, for review by Consultant. Each form shall include the following information:

.1 General Information:

.1 Contract name and number.

.2 Specification Section name(s) and number(s).

.3 Equipment and System Description: Indicate all related Systems or Subsystems proposed to be Commissioned. Indicate whether the form is for Commissioning a complete, or partially complete, System, combination of Systems or Subsystems.

.4 Indicate whether the form is for re-Commissioning a System, combination of Systems or Subsystems that previously were unsuccessfully, or partially Commissioned.

.5 Submittal Date: Date of submission.

.6 Proposed Commissioning Date: Coordinate the date with Contractor and Consultant to ensure availability of the 'Commissioning Team' participants.

.7 Proposed Duration: As coordinated with Contractor and Consultant, the estimated duration, in days or hours, required for Commissioning each System or Subsystem.

.2 Attachments:

.1 Attach to each Certificate of Readiness form all relevant submittals for each System, combination of Systems or Subsystems scheduled to be Commissioned, including but not limited to, the following:

.1 List of proposed attendees: List of the Contractor's Commissioning team personnel, including Subcontractors and manufacturers associated with the Work being Commissioned. Include the following information for each individual:

.1 Company name.

.2 Representative name.

.3 Phone number.

.4 Responsibilities.

.2 Commissioning procedures, as reviewed by Contractor and Consultant, and updated, if required, based on the Start-up and Testing Process.

.3 Start-up and Testing Process reports, including the Operational and Functional Performance Test sheets, as well as the vendor start up tests.

.4 Inspection reports and certificates of the authority having jurisdiction, where applicable.

.5 Pre-start health and safety reports, where applicable.

.6 Testing, Adjusting and Balancing (TAB) reports, where applicable.

.7 List of deferred Functional Performance Testing, for Commissioning requiring off-season conditions.

.8 Factory test documentation, where applicable.

.9 Proof of test equipment calibration, where applicable.

.10 Letters or test certificates from System(s) or Subsystem(s) manufacturers, indicating their technical representatives have inspected and tested respective Systems, combination of Systems, or Subsystems, and approve the methods of installation and operation.

.3 Where the Certificate of Readiness form is submitted for a partially completed System or Subsystem, also attach following information:

.1 Complete list of incomplete Work and associated deficiencies.

.2 Indicate uncompleted portion(s) of the Work and how they will be simulated so that Operational and Functional Performance Testing can be performed.

.3 Detailed description of each portion(s) of the System or Subsystem proposed to be Commissioned.

.4 Deficiency reports:

.1 After completing Commissioning for each System or Subsystem, submit a detailed deficiency report, in Microsoft Excel electronic format. Include the following information:

.1 Signed attendee list.

.2 Detailed list and description of all construction deficiencies noted during Commissioning.

.3 Deficiencies under dispute.

.4 Identify Subcontractor(s) required to perform the Work.

.5 Scheduled date for correcting each deficiency.

.6 Proposed schedule for re-Commissioning.

.5 Commissioning close-out report:

.1 After the successful completion of the Commissioning for each System, combination of Systems, or Subsystems, submit individual Commissioning close-out reports. Notwithstanding submittal requirements specified elsewhere in the Specifications, the Commissioning close out reports shall include the following document attachments:

.1 Final Start-up and Testing Process reports, including Operational and Functional Performance Test results, as well as vendor start-up tests.

.2 Final Commissioning procedures.

.3 Completed test forms.

.4 Energy Performance, including monitoring schedule

.5 Test certificates and Certificate of Commissioning completeness.

.6 Authority having jurisdiction reports and certificates, where applicable.

.7 Pre-start health and safety review reports, where applicable.

.8 List of deferred Functional Performance Testing, for Commissioning requiring off-season conditions.

.9 Final TAB reports, where applicable.

.10 Reports of Commissioning activities, including deficiencies identified and corrective actions taken.

.11 Signed list of attendees.

1.6 COMMISSIONING PROCESS

.1 Commissioning Plan:

.1 Submit six copies of the draft Commissioning Plan to Consultant in accordance with Section 01 33 00.

.2 Consultant shall provide comments on the Commissioning Plan in accordance with Section 01 33 00. A final 'Reviewed' or "Reviewed as Noted' Commissioning Plan must be available 90 calendar days after commencement of construction at the site, and prior to submittal of the Commissioning Procedures.

.2 Commissioning Procedures:

.1 Submit a draft of the Commissioning Procedures to Consultant according to the reviewed Commissioning Plan and in accordance with Section 01 33 00.

.2 Consultant shall provide comments on the Commissioning Procedures in accordance with Section 01 33 00. A final 'Reviewed' or 'Reviewed as Noted' Commissioning Procedures must be available ninety calendar days prior to Commissioning and prior to scheduling the Commissioning Start-up and Testing Process.

.3 Commissioning:

.1 Coordinate and schedule Commissioning of each System, combination of Systems, Subsystems and Intersystem performance to ensure the availability of Contractor and Consultant. Contractor and Consultant may request other personnel to witness the Commissioning. Unless otherwise accepted by Contractor and Consultant, and except when Integrated Systems Tests are scheduled, schedule Commissioning so no more than one System is commissioned at a time.

.2 Perform Integrated Systems Tests to confirm that Systems and Subsystems perform and function in concert according to the design intent and requirements of the Contract Documents.

.3 Commissioning must not be scheduled until the Contractor has successfully completed the Start-up and Testing Process and the Certificate of Readiness is submitted for review by Contractor and Consultant. Commissioning or re-Commissioning will not be performed until the Certificate of Readiness has been reviewed.

.4 Schedule Commissioning a minimum of twenty-one calendar days after the submission date of Certificate of Readiness.

.5 Prior to Commissioning, the 'Reviewed' or 'Reviewed as Noted' operation and maintenance manuals must be available in accordance with Section 01 70 00 - Contract Closeout.

.6 Make adjustments and corrections to the operation and maintenance manuals as necessary during Commissioning and submit the final version, including the Commissioning Close-out Reports, in accordance with Section 01 70 00 - Contract Closeout.

.7 Make available the original equipment manufacturer's trained certified representatives familiar with the Systems, combination of Systems, or Subsystems being Commissioned to demonstrate their operation in their entirety, including all control sequences. Consultant reserves the right to request additional representation, at no cost to Contract. Consultant reserves the right to request *adhoc* testing beyond the Commissioning procedures, the need for which may become evident during Commissioning.

.8 Provide the necessary tools and equipment to perform the tests as required. The test equipment shall be configured to the manufacturer's written instructions and the latest edition of applicable codes and standards.

.9 Where more than one discipline is responsible for Work regarding a System, combination of Systems, or Subsystems being Commissioned, the Contractor's representative from each discipline shall be present. Consultant reserves the right to request additional representation at no cost to Contract.

.10 When Consultant's personnel arrive at the Site and scheduled Commissioning or re-Commissioning cannot be performed as a result of deficiencies, or the Systems, combination of Systems or Subsystems are incomplete, unsuccessful test results, or the Contractor's representatives are not present or not familiar with the operation or control sequences for the purposes of demonstration, Commissioning will be postponed at the discretion of Consultant. Under such circumstances, the Contractor shall pay all costs to Contract due to the postponement.

.11 Resubmit the Certificate of Readiness and reschedule the postponed Commissioning or re Commissioning to a date accepted by Consultant.

.12 The Contractor or Consultant may reschedule Commissioning without penalty, provided a minimum of two working days' notice is given. Commissioning shall be rescheduled to a date accepted by Consultant.

.13 After Commissioning each System, combination of Systems or Subsystems, submit the deficiency reports within seven calendar days, where applicable, in accordance with Section 01 33 00. The Contractor shall proceed immediately to correct the deficiencies in the Work that become evident during Commissioning and update the schedule in accordance with Section 01 32 16 - Construction Progress Schedule. Resubmit the Certificate of Readiness, reschedule and repeat the Commissioning as required by Consultant, and at a date accepted by Consultant, at no additional cost to Contract. To ensure subsequent Work has not impacted previously successful testing, a repeat of the Commissioning may be required at Consultant's discretion, which shall be supported by the original equipment manufacturer's trained and certified representatives, as deemed necessary by Consultant.

.14 Commissioning shall be considered successfully completed only after:

.1 Noted deficiencies are corrected and final acceptance by Consultant has been obtained.

.2 Operation and maintenance manuals, including the Commissioning close-out report, have been submitted in accordance with Section 01 70 00 - Contract Closeout.

.3 Deferred Commissioning reports have been submitted in accordance with Section 01 33 00.

.15 Deferred Commissioning:

.1 If deemed necessary by Consultant, schedule and perform Commissioning requiring off-season conditions immediately when suitable weather conditions permit.

.2 Correct deficiencies within fifteen calendar days, unless agreed otherwise with Consultant.

.3 Submit deferred Commissioning close-out reports a maximum of twenty-one calendar days after successfully completing such tests.

END OF SECTION

COMMISSIONING (Cx)
CERTIFICATE OF READINESS

GENERAL INFORMATION			
Project Name	**4 Campbell Drive, Uxbridge**	**Project Number**	**22042**
Spec Section #			
Equip / System Description			
Repeat of Previous Unsuccessful Cx Attempt?			⬜ **YES** ⬜ **NO**
Submittal Date:			
Proposed Cx Date (min 21 days after Certificate Submission Date):			
Proposed Duration:			

PRE-REQUISITE INFORMATION	
1. List of Proposed Attendees Attached:	⬜ **YES** ⬜ **NO**

2. Commissioning Procedures Attached:	
2.1	⬜ **YES** ⬜ **NO**
2.2	⬜ **YES** ⬜ **NO**
2.3	⬜ **YES** ⬜ **NO**
2.4	⬜ **YES** ⬜ **NO**
2.5	⬜ **YES** ⬜ **NO**

3. Start-up and Testing Process Reports Attached:	
3.1	⬜ **YES** ⬜ **NO**
3.2	⬜ **YES** ⬜ **NO**
3.3	⬜ **YES** ⬜ **NO**
3.4	⬜ **YES** ⬜ **NO**
3.5	⬜ **YES** ⬜ **NO**

4. Jurisdictional Authority Inspection Reports Attached:	⬜ **NOT APPLICABLE**
4.1	⬜ **YES** ⬜ **NO**
4.2	⬜ **YES** ⬜ **NO**
4.3	⬜ **YES** ⬜ **NO**
4.4	⬜ **YES** ⬜ **NO**
4.5	⬜ **YES** ⬜ **NO**

5. Pre-Start Health and Safety Review Reports Attached:	⬜ **YES**	⬜ **NO**	⬜ **N/A**
6. TAB Reports Attached:	⬜ **YES**	⬜ **NO**	⬜ **N/A**
7. List of Deferred Functional Performance Test:	⬜ **YES**	⬜ **NO**	⬜ **N/A**
8. Factory Test Documentation Attached:	⬜ **YES**	⬜ **NO**	⬜ **N/A**
9. Test Equipment Calibration Information Attached:	⬜ **YES**	⬜ **NO**	⬜ **N/A**

By submitting this requisition form and attachments, the Contractor certifies all equipment, systems and/or subsystems scheduled for Commissioning meet all governing regulatory codes and standards, manufacturer and Contract Document requirements and Start-up and Testing Process has been performed successfully.

Signed: _____

Dated: _____

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 41 00 – Demolition.

.2 Section 02 41 16 – Selective Demolition.

.3 Section 07 84 00 – Fire Stopping and Smoke Seals.

.4 Section 21 05 10 – Firestopping.

.5 Divisions 21, 22 and 23 Mechanical.

.6 Division 26 Electrical.

1.2 DEFINITIONS

.1 Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

.2 Patching: Fitting and repair work required to restore surfaces and substrates to original conditions after installation of other Work.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Cutting and Patching Proposal: Submit a proposal in accordance with Section 01 33 00 – Submittal Procedures, describing procedures at least 7 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

.1 Extent: Describe cutting and patching and how they will be performed.

.2 Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

.3 Products: List products to be used and firms or entities that will perform the Work.

.4 Dates: Indicate when cutting and patching will be performed and identify by room number on a cutting and patching schedule; coordinate schedule with fire stopping work and electrical and mechanical work.

.5 Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.

.6 Consultant's Acceptance: Obtain acceptance of cutting and patching proposal before cutting and patching. Review and acceptance of cutting and patching proposal does not waive right to later require removal and replacement of unsatisfactory work, or the requirements to perform work to meet of exceed Ontario Building Code and amendments.

1.4 QUALITY ASSURANCE

.1 Structural Elements: Do not cut and patch structural elements without the delegated design inputs and supervision of a qualified Professional Engineer (P.Eng.) licenced to practice in Ontario.

.2 Operational Elements: Do not cut and patch operating elements and related components in a manner that results in impairing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety, including the following:

.1 Primary operational systems and equipment.

.2 Air or smoke barriers.

.3 Fire protection systems.

.4 Control systems.
.5 Communication systems.
.6 Conveying systems.
.7 Electrical wiring systems.

.3 Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety, including the following:
.1 Water, moisture, or vapour barriers.
.2 Membranes and flashings.
.3 Exterior wall construction.
.4 Equipment supports.
.5 Piping, ductwork, vessels, and equipment.
.6 Noise and vibration control elements and systems.

.4 Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that reduces the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

.5 Cutting and Patching Conference: Before proceeding, meet at project site with parties involved in cutting and patching, including firestopping, mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

.6 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

Part 2 Products

2.1 MATERIALS

.1 General: Comply with requirements specified in other Sections of the Contract Specifications.

.2 Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible:
.1 If identical materials are unavailable or cannot be used, use materials that, when installed, will match the appearance and performance of existing materials.

Part 3 Execution

3.1 EXAMINATION

.1 Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed:
.1 Provide ultrasound or other approved methods to determine locations of existing services and reinforcing in existing floors and walls before cutting and renovations. Advise Consultant of findings before proceeding with the Work and revise cutting or coring locations as required and directed by Consultant.
.2 Compatibility: Before patching, verify compatibility with substrates, including compatibility with existing finishes or primers.

.3 Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Temporary Support: Provide temporary support of Work to be cut in accordance with Section 01 56 00 – Temporary barriers and Enclosures.

.2 Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

.3 Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

.4 Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

.5 Indoor Air Quality: take measures as required to prevent migration of dust and debris to areas outside the immediate work area.

3.3 PERFORMANCE

.1 General: employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay:

.1 Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

.2 Cutting: cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations:

.1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

.2 Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

.3 Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond core drill.

.4 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

.5 Proceed with patching after construction operations requiring cutting are complete.

.3 Patching: patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications:

.1 Inspection: where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

.3 Floors and Walls: where walls or partitions that are removed extend from one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.4 Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

.5 Where patching occurs in a finished surface other than paint, match existing finish and blend in as required; ensure patch is not visible in public areas.

.6 Ceilings: patch, repair, or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

.7 Exterior Building Enclosure: patch components in a manner that restores performance of enclosure.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 07 50 – Cutting and Patching.

.2 Section 02 41 16 – Selective Demolition.

.3 Section 02 41 29 – Elevator Decommissioning.

.4 Section 03 01 30.71 – Concrete Repairs.

.5 Electrical and Mechanical Drawings and Specifications.

1.2 REFERENCES

.1 American National Standards Institute (ANSI):

.1 ANSI A10.8-2011, Safety Requirements for Scaffolding.

.2 Canadian Federal Legislation:

.1 Motor Vehicle Safety Act (MVSA), 1995.

.2 Hazardous Materials Information Review Act, 1985.

.3 CSA Group (CSA):

.1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.4 Provincial Legislation:

.1 Legislation specific to Authority Having Jurisdiction for work governed by this Section.

1.3 DEFINITIONS

.1 Deconstruction (deconstruct) systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.

.1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.

.2 Demolition (demolish): Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.3 Disassembly (dismantle): physical detachment of materials from structure: prying, pulling, cutting, unscrewing.

.4 Remove and Salvage: Detach items from existing construction and deliver them to Owner.

.5 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.6 Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Demolition Meeting: Conduct a pre-demolition meeting at Project site in accordance with requirements listed in Section 01 31 19 – Project Meetings, to confirm extent of salvaged and demolished materials; and to review Contractor's demolition plan prepared by a professional engineer.

.2 Coordination:

.1 Coordinate demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.

.2 Coordinate with building manager and other tenants ongoing site operations, and limit the number of interruptions during regular business hours.

.3 Coordination with continuing occupancy of portions of existing building and of partial occupancy of completed Work.

.4 Coordination for shutoff, capping, and continuation of utility services.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Qualification Data: For firms and persons specified below to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses and other information specified.

.3 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 19 - Waste Management and Disposal and indicate:

.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.

.2 Detailed sequence of demolition and removal work, with starting and ending dates for each activity.

.3 Schedule of demolition.

.4 Number and location of dumpsters.

.5 Anticipated frequency of tippage.

.6 Name and address of haulers, waste facilities, waste receiving organizations.

.4 Removal and Dismantling Program: Prepare and submit a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of removal and dismantling work, including protection of surrounding and substrate materials and site.

.5 Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Owner reserves the right to make modifications where proposed methods interfere with the Owner's ongoing operations.

.6 Inventory: Submit a list of items that have been removed and salvaged after demolition is complete.

.7 Pre-demolition digital Photographs (high-definition, well lit, clear) or Videotape (high-definition, well lit, clear): Submit photographs or videotape indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by demolition operations.

1.6 DECONSTRUCTION / DEMOLITION DRAWINGS

.1 Where required by authorities having jurisdiction, submit for approval drawings, diagrams and details showing sequence of deconstruction work, materials designated for salvage and support of structures and underpinning.

.2 Submit drawings stamped and signed by qualified professional engineer, registered or licensed in Province of Ontario, Canada

1.7 QUALITY ASSURANCE

.1 Indoor Air Quality: meet or exceed requirements of Section 01 35 46 – Indoor Air Quality Requirements.

.2 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial and federal jurisdictions:

.1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the Authority Having Jurisdiction.

.2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of authority having jurisdiction.

.3 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:

.1 Conform to the requirements of Section S01 35 29.06 - Health and Safety Requirements.

.2 Conform to Workers' Compensation Board Regulations.

.3 Conform to City of Toronto bylaws and regulations governing this type of work.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

.2 Except where otherwise specified, all materials indicated or specified to be permanently removed from the Place of the Work shall become Contractor's property. Maximize to the fullest extent possible, salvage, and recycling of such materials, consistent with proper economy and expeditious performance of the Work.

.3 To reduce the quantity of material otherwise destined for disposal at a landfill, the Contractor is encouraged to consider utilizing the services of businesses and non-profit organizations that specialize in salvage and recycling of used building materials, but does so at his own option and risk.

1.9 SITE CONDITIONS

.1 Investigate site and structure to determine dismantling, processing and storage logistics required prior to beginning of Work. Note all characteristics and irregularities affecting the work of this Section.

.2 Develop strategy for deconstruction and demolition to facilitate optimum salvage of reusable and recyclable materials.

.3 Owner will occupy portions of building immediately adjacent to demolition area:

.1 Conduct demolition so that Owner's operations will not be disrupted.

.2 Provide not less than 72 hours notice to Building Manager of activities that will affect Owner's operations

.4 Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities:

.1 Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

.5 Should material resembling spray or trowel-applied asbestos, or other asbestos containing material, or other designated substance listed as hazardous as defined in the Hazardous Materials Act be encountered, stop work in location identified, take preventative measures, and notify Consultant.

Part 2 Products

2.1 SALVAGED ITEMS

.1 Items salvaged by Constructor and retained by Owner or reinstalled by Contractor as part of the Work include, but are not limited to:

.1 Remove and Salvage:

.1 Contractor shall remove, retain and store existing door hardware for re-use by Owner; including but not limited to: card readers, maglocks, levers, cylinders, panic hardware, automatic push-button hardware and closers, and all related accessories, screws, bolts and plates. Stockpile in safe, secure, and dry space, at location identified by Owner. Include.

.2 Remove and Reinstall:

.1 Contractor shall remove, retain and store existing cyber-key cylinders, and re-install in new doors as directed by Consultant in accordance with the Construction Schedule.

.2 Confirm with Owner additional items that appear salvageable prior to disposal.

Part 3 Execution

3.1 EXAMINATION

.1 Inspect building with Owner and Consultant, and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Verify that utilities have been disconnected and capped as required.

.3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

.4 Notify the Consultant where existing mechanical, electrical, or structural elements conflict with intended function or design:

.1 Investigate and measure the nature and extent of conflict and submit a written report to Consultant.

.2 Consultant will issue additional instructions or revise drawings as required to correct conflict.

.5 Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.2 INDOOR AIR QUALITY REQUIREMENTS

.1 Indoor Air Quality Control Requirements: Perform work in accordance with IAQ requirements specified in Section 01 35 46 and as follows:

.1 Reduce dust contamination by:

.1 Ensuring adjacent HVAC ducts are sealed prior to cutting,

.2 Collecting and bagging dust from tools,

.3 Isolating cutting areas from adjacent workspaces, and

.4 Sweeping and/or vacuuming daily.

3.3 PREPARATION

.1 Obtain necessary permits and approvals required by authorities having jurisdiction.

.1 Provide copies to Consultant prior to start of Work on site, and within 24 hours of written request.

.2 Maintain or otherwise re-route as required electrical, telephone and communication service lines effected by the work of this Section to ensure continuity and ongoing, uninterrupted performance of systems effected.

.3 Post warning signs on electrical lines and equipment that must remain energized to serve other products and parts of the Work during period of demolition.

.4 Locate and protect utility lines. Do not disrupt active or energized utilities designated to remain undisturbed.

.5 Disconnect and cap designated services as required. Comply with requirements of utility companies and authorities having jurisdiction.

.6 Identify and mark all equipment and materials identified to be retained by Owner or to be re-used in subsequent construction. Separate and store items to be retained in an area away from area of demolition and protect from accidental disposal.

.7 Provide and maintain barricades, warning signs, protection for personnel, occupants and the public during the full extent of the Work. Read drawings carefully to ascertain extent of protection required.

.8 Mark all materials required to be re-used, store in a safe place until ready for re-installation.

.9 Adjust all junction boxes, receptacles and switch boxes flush with new wall construction where additional layers to existing construction are indicated.

3.4 SALVAGE PROCEDURES

.1 Remove and handle salvageable items to minimize damage and to ensure that usability is maintained.

.2 Clean, decontaminate, or remediate hazardous substances (lead based paint, asbestos dust, PCB residue, and similar substances) from salvaged materials so they are safe for reuse.

.3 Place materials on palettes or wrap in protective film to ensure that loose pieces and projections do not cause injury to personnel, and that salvaged items remain as complete units.

.4 Clean items of construction or building debris, or materials that are not a part of salvaged work before delivering to Owner.

3.5 PROTECTION

.1 Take precautions to guard against damage to adjacent materials, substrates, finishes and assemblies. Be liable for any damage or injury caused.

.2 Cease operations and notify Consultant if safety or any adjacent work appears to be endangered. Do not resume operations until reviewed with Consultant.

.3 Ensure safe passage of building occupants around and through area of demolition.

.4 Keep noise, dust, and inconvenience to occupants to minimum.

.5 Protect building systems, services and equipment.

.6 Provide temporary dust screens, covers, railings, supports and other protection as required.

.7 Provide and maintain fire prevention equipment and alarms accessible during demolition.

.8 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

3.6 DISASSEMBLY

.1 Materials not identified for reuse during later phases of Work, or identified to be set aside and delivered to Owner, shall be removed from site and are property of Contractor.

.2 Throughout the course of deconstruction pay close attention to connections and material assemblies. Employ workmanship procedures which minimize damage to materials and equipment.

.3 Ensure workers and subcontractors are briefed and trained as necessary to carry out work in accordance with appropriate deconstruction techniques.

.4 Project supervisor with previous deconstruction experience shall be present on site throughout work of this Section.

.5 Deconstruct in accordance with CSA S350 and other applicable safety standards.

.6 Workers must utilize adequate fall protection in accordance with governing regulations.

.7 Maintain structural integrity of structure.

.8 Systematically remove finishes, furnishings, and mechanical and electrical equipment of value, as indicated, or as instructed by Consultant.

.9 Disassemble non-loadbearing interior partitions and remove materials from structure.

.10 Wherever possible, transfer material assemblies from heights to floor level for easier disassembly. Take appropriate measures to ensure safety.

.11 Separate from waste stream, material designated for alternate disposal, in condition suitable for reuse or recycling, or listed to required rates of diversion.

.12 Where existing materials are to be re-used in Work, use special care in removal, handling, storage and re-installation to assure proper function in completed work.

.13 Remove and store materials to be salvaged in manner to prevent damage.

- .1 Store and protect in accordance with requirements for maximum preservation of material.
- .2 Handle salvaged materials as new materials.
- .3 Contractor to retain and store existing door hardware for re-use by Owner. Stockpile in safe, dry space. Include card readers, maglocks, levers, cylinders, panic hardware, automatic push-button hardware and closers.

.4 Contractor to retain and hold existing cyber-key cylinders for reuse and incorporation into the Work.

.5 Remove fire hose cabinet for relocation as indicated; coordinate with mechanical trades as required.

.6 Remove and hold indicated door for re-hanging with opposite door swing; coordinate with other trades as required.

.14 Source separate for recycling materials that cannot be salvaged for reuse, including wood, metal, concrete and asphalt.

.15 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

3.7 DEMOLITION

.1 Demolish and dismantle work in a neat and orderly manner and in accordance with relevant laws and regulations.

.2 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling.

.3 Demolish in a manner to minimize dusting and to prevent migration of dust.

.4 Selling or burning of materials on the site is not permitted.

.5 Remove concrete bases by cutting and chipping, take precautions against slab cracking and degradation. Grind edges smooth, fill and make level with self levelling grout.

.6 Demolish existing flooring and adhesive remnants identified as part of the work of this Section as follows:

.1 Vacuum existing carpet thoroughly, prior to removal, using vacuum equipped with power head/sweeper.

.2 Use procedures that minimize dust generation during removal.

.3 Demolish existing residual floor finishes, remove and dispose of off site.

.4 Remove adhesive to the greatest extent possible using scrapping tools and as follows:

.1 Do not use solvent-based cleaners to remove adhesive remnants.

.2 Lightly shot blast or grind floor using machine designed for purpose to remove adhesive remnants.

.5 Floor substrate shall be smooth, free from ridges and depressions, and adhesive remnants that could telegraph through resilient flooring materials and carpets.

.7 Demolish existing tile finishes identified as part of the work of this Section. Remove setting bed or adhesive to the greatest extent possible using mechanical scrapping tools.

.8 Demolish ceiling finishes identified as part of the work of this Section.

.9 Remove all wall coverings scheduled for demolition.

3.8 UTILITY SERVICES

.1 Coordinate existing services indicated to remain and protect them against damage during demolition and deconstruction operations.

.2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

.1 Arrange to shut off affected utilities with utility companies.

.2 If utility services are required to be removed, relocated, or abandoned, before proceeding with demolition provide temporary utilities that bypass area of demolition and that maintain continuity of service to other parts of building.

.3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

.3 Coordinate with mechanical and electrical sections for shutting off, disconnecting, removing, and sealing or capping utilities.

.4 Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.9 CORING, DRILLING AND SAW-CUTTING CONCRETE

.1 Work shall comply with requirements of Section 02 07 50 – Cutting and Patching.

.2 Do not proceed with any work of this nature without prior written approval of Consultant.

.3 Complete ultrasound inspection of concrete slab before coring. Employ services of experienced operator. Confirm with Consultant, before coring or drilling, location of reinforcing steel and raceways that may be present.

.4 Core slabs to avoid reinforcing steel, electrical conduit, water pipes or other services; adjust core location and coordinate with Consultant where slab features interfere with core drilling.

.5 Perform coring and drilling after normal working hours, unless specified otherwise. Confirm coring and drilling times with Consultant.

.6 Dry core drilling and saw-cutting is acceptable. Do not use wet core procedures with prior written approval of Consultant.

.7 Do not core structural beams or cut conduits or reinforcing steel without written permission from Consultant.

3.10 REMOVAL FROM SITE

.1 Transport material designated for alternate disposal to approved facilities and receiving organizations listed in waste reduction workplan and in accordance with applicable regulations. Do not deviate from facilities and receiving organizations listed in waste reduction workplan without prior written authorization from Consultant.

.2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations. Disposal facilities must be approved of and listed in waste reduction workplan. Do not deviate from disposal facilities listed in waste reduction workplan without prior written authorization from Consultant.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work areas clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

3.12 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Retain a structural engineer as required by the Ontario Building Code 2012 as amended (OBC).

.2 Apply for, pay for, and obtain a permit for the demolition portions of the Work as required by OBC. The Owner will provide any information they may have concerning the nature of the existing elements to be demolished.

.3 Ensure that the safety of the occupants and visitors to the existing facility is not affected, as required by OBC.

.4 Coordinate with requirements indicated on Drawings.

1.2 RELATED REQUIREMENTS

.1 Section 02 07 50 – Cutting and Patching.

.2 Section 02 41 00 – Demolition.

.3 Section 02 41 29 – Elevator Decommissioning.

.4 Section 03 01 30.71 – Concrete Repairs.

.5 Electrical and Mechanical Drawings and Specifications.

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A10.8-2011, Safety Requirements for Scaffolding & Comparison Document.

.2 Canadian Federal Legislation

.1 Motor Vehicle Safety Act (MVSA), 1995.

.2 Hazardous Materials Information Review Act, 1985.

.3 Transportation of Dangerous Goods Act, 1992 (1992, c. 34).

.3 CSA Group (CSA)

.1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.4 National Fire Protection Association (NFPA)

.1 NFPA (Fire) 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2013 Edition.

.5 Municipal Requirements

.1 In accordance with regulations of Authority Having Jurisdiction by-laws and ordinances pertaining to the work of this Section.

.6 U.S. Environmental Protection Agency (EPA)

.1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.

.2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.

.3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

.2 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.

.1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.

.3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos, lead-based paint, PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.

.4 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.

.1 Recycling does not include burning, incinerating, or thermally destroying waste.

.6 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from remodelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.7 Salvage: removal of structural and non-structural materials from deconstruction/ disassembly work for purpose of reuse or recycling.

.8 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.9 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.

.10 Waste Reduction Workplan (WRW): written report that addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Demolition Meeting: Conduct a pre-demolition meeting at Project site 1 week prior to beginning work of this Section to:

.1 Verify project requirements.

.2 Verify existing site conditions adjacent to demolition work.

.3 Coordination with other construction trades.

.2 Hold project meetings every week.

.3 Ensure key personnel attend.

.4 Consultant will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.5 Scheduling:

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.2 In event of unforeseen delay notify Consultant in writing.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Qualification Data: For firms and persons specified below to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses and other information specified.

.2 Prior to beginning of Work on site submit detailed Waste Reduction Workplan and indicate:

.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

.5 Name and address of haulers, waste facilities, and waste receiving organizations.

.3 Shop Drawings:

.1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.

.2 Submit demolition drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.3 Hazardous Materials:

.1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 33 00 - Submittal Procedures.

.2 Removal and Dismantling Program: Prepare and submit a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of removal and dismantling work, including protection of surrounding and substrate materials and site.

.3 Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Owner reserves the right to make modifications where proposed methods interfere with existing facility’s ongoing operations.

.4 Inventory: Submit a list of items that have been removed and salvaged after demolition is complete.

.5 Pre-demolition digital Photographs (high-definition, well lit, clear) or Videotape (high-definition, well lit, clear): Submit photographs or videotape indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by demolition operations.

1.2 QUALITY ASSURANCE

.1 Comply with requirements indicated on the Contract Drawings. Work shall conform to CSA S350.

.2 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial and federal jurisdictions:

.1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the Authority Having Jurisdiction.

.2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of Authority Having Jurisdiction.

.3 Collection and transport of hazardous materials, if required, shall comply with The Transportation of Dangerous Goods (TDG) Act.

.3 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:

.1 Conform to the Ontario Occupational Health and Safety Act and Regulations, as amended.

.2 Conform to Workers' Compensation Board Regulations.

.3 Conform to Authority Having Jurisdiction bylaws, ordinances, and regulations that govern this type of work.

1.3 SITE CONDITIONS

.1 Environmental protection:

.1 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.2 Fires and burning of waste or materials is not permitted on site.

.3 Do not bury rubbish waste materials.

.4 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.5 Ensure proper disposal procedures are maintained throughout project.

.2 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.

.4 Protect trees, plants and foliage on site and adjacent properties where indicated.

.5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

.7 Should material resembling spray or trowel-applied asbestos, or other asbestos containing material, or other designated substance listed as hazardous as defined in the Hazardous Materials Act be encountered, stop work in location identified, take preventative measures, and notify Design-Builder and existing facility operator immediately.

Part 2 Products

2.1 TEMPORARY SUPPORT STRUCTURES

.1 Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in province of the Work.

2.2 EQUIPMENT

.1 Use equipment suitable for work required, meeting current emissions standards.

.2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

2.3 MATERIALS

.1 Supply perimeter fencing and hoarding at the site in accordance with governing regulations and as required to protect persons and property.

Part 3 Execution

3.1 PREPARATION

.1 Work in accordance with Section 01 35 43 – Environmental Procedures.

.2 Inspect site with Consultant and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.3 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.4 Notify and obtain approval of utility companies and Consultant before starting demolition.

.5 Immediately notify Consultant and utility company concerned in case of damage to any utility or service, designated to remain in place.

.6 Immediately notify the Consultant should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PROTECTION

.1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.

.2 Keep noise, dust, and inconvenience to occupants of adjacent properties to a minimum.

.3 Protect adjacent property systems, services, and equipment.

.4 Provide temporary dust screens, covers, railings, supports, and other protection as required to meet regulations and requirements of authorities having jurisdiction.

.5 Do Work in accordance with the Occupational Health & Safety Act and applicable regulations of Ontario.

3.3 REMOVAL OF HAZARDOUS WASTES

.1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.4 DECONSTRUCTION / DEMOLITION

.1 Scope is defined at item 3.11 SCHEDULE of this Section and on Drawings; perform all work specified and indicated.

.2 Obtain necessary permits and approvals required by authorities having jurisdiction.

.3 Do Work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.4 Deconstruct, salvage, transport and store items indicated on Drawings to be salvaged and provided to Consultant, or re-used as part of Contract. Store safely and protect from elements and damage. Provide to Owner as directed.

.5 Demolish and remove items as indicated.

.6 Do not disturb items designated to remain in place.

.7 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Consultant.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.8 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

.9 Excavate at least 300 mm below pipe invert when removing pipes under existing or future pavement area.

.10 Remove only designated trees during demolition.

.1 Obtain written approval of Consultant prior to removal of trees.

.11 Sell or donate trees designated for removal that are healthy and marketable.

.1 Grind, chip, or shred other vegetation for mulching and composting, or use as mill pulp or process fuel.

.12 Stockpile topsoil for final grading and landscaping:

.1 Provide erosion control and seeding if not immediately used.

.13 Salvage: divert waste from landfill and carbon-generating power plants to the extent practicable

.1 Dismantle items containing materials for salvage and stockpile salvaged materials at locations approved by Consultant.

.14 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse on site at authorized facilities.

.2 Trim disposal areas to approval of Consultant.

.15 Backfill:

.1 Backfill in areas as indicated and in accordance with Section 31 05 00 - Common Work Results for Earthwork.

3.5 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.6 REMOVAL FROM SITE

.1 Remove stockpiled material when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.3 Transport material designated for alternate disposal in accordance with applicable regulations and the requirements of this specification Section.

.4 Written authorization from Consultant is required to deviate from identified receiving organizations.

.5 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.6 Written authorization from Consultant is required to deviate from identified disposal facilities.

3.7 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

.2 Use soil treatments and procedures that are not harmful to health or the environment, are not injurious to plants, and do not endanger wildlife, adjacent water courses, or ground water.

3.8 FIELD QUALITY CONTROL

.1 Verification requirements include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Salvage and storage of items designated for reuse.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.10 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.11 SCHEDULE

.1 Refer to Contract Drawings for deconstruction / demolition scope and demolition notes. Comply with notes on Drawings.

.2 Demolition Scope (confirm scope with Consultant and Owner before proceeding):

.1 Demolition of the existing driveway into the site as required to install new services.

.2 Demolition of retaining structure at east side of existing driveway as required to build new sidewalk and retaining wall.

.3 Demolition of existing shed on site used to house some existing lighting and irrigation controls.

.4 Removal of existing light fixtures along existing pathways (return to Owner).

.5 Removal of existing "Stations of the Cross” park, including pathways, planting, and 14 Stations of the Stations of the Cross sculptures (return to Owner).

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 – Structural Cast-in-Place Concrete.

.2 Section 05 12 00 – Structural Steel Framing.

.3 Section 05 41 00 – Structural Metal Studs.

.4 Section 05 51 29 – Metal Stairs and Ladders.

.5 Section 06 10 00 – Rough Carpentry.

.6 Section 06 40 00 – Architectural Woodwork.

.7 Section 07 46 90 – Soffits.

.8 Section 07 52 16 – Two-Ply Conventional Membrane Roof.

.9 Section 07 55 52 – Two-Ply Protected SBS Membrane Roof.

.10 Section 09 21 16 – Gypsum Board Assemblies.

.11 Section 09 54 00 – Wood Grille Ceilings.

.12 Section 09 91 00 – Painting.

.13 Section 10 01 00 – Miscellaneous Specialties.

.14 Section 10 21 13.19 – Plastic Toilet Compartments.

.15 Section 10 28 13 – Toilet and Bath Accessories.

.16 Section 11 24 24 – Fall Arrest Equipment.

.17 Section 11 53 13 - Laboratory Fume Hoods.

.18 Section 12 35 53 - Steel Laboratory Casework.

.19 Section 14 01 20 – Maintenance of Freight Material Lift.

.20 Section 14 21 53 – Machineroomless Traction Passenger Elevators.

.21 Section 14 24 13 – Freight Material Lift.

.22 Section 14 91 33 – Linen Chutes.

.23 Section 14 91 82 – Garbage Chutes.

1.2 REFERENCES

.1 American Association of State and Highway Transportation Officials (AASHTO)

.1 AASHTO M 300-03(2017), Standard Specification for Inorganic Zinc-Rich Primer.

.2 ASTM International (ASTM)

.1 ASTM A53/A53M 12, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.

.2 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A153/A153M-16A, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.4 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.5 ASTM A325-14, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.6 ASTM A780/A780M-09(R2015), Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.7 ASTM A786/A786M-15, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.

.8 ASTM B188-15e1, Standard Specification for Seamless Copper Bus Pipe and Tube.

.9 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.10 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.11 ASTM B308/B308M-10, Standard Specification for Aluminum-Alloy 6061 T6 Standard Structural Profiles.

.12 ASTM B429/B429M-10e1, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

.13 ASTM B632/B632M-15, Standard Specification for Aluminum-Alloy Rolled Tread Plate.

.14 ASTM F468-15, Standard Specification for Non-Ferrous Bolts, Hex Cap Screws, Socket Head Cap Screws, and Studs for General Use.

.15 ASTM F3125/F3125M-15A, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.3 Canadian Institute of Steel Construction (CISC)

.1 Code of Standard Practice for Structural Steel, 2010.

.2 Guide for Specifying Architecturally Exposed Steel, 2nd Edition.

.3 Handbook of Steel Construction - 11th Edition.

.4 Limit States Design in Structural Steel, 9th Edition.

.5 Steel Fabrication Quality Systems Guideline, 2nd Edition with Commentary.

.4 CSA Group (CSA)

.1 CAN/CSA G40.20/G40.21 13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA S16-14, Design of steel structures, Includes Update No. 1 (2010), Update No. 2 (2010), Update No. 3 (2013).

.3 CSA W47.1-09 (R2014), Certification of companies for fusion welding of steel.

.4 CSA W48-14, Filler metals and allied materials for metal arc welding.

.5 CSA W55.3-08(R2013), Certification of companies for resistance welding of steel and aluminum.

.6 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.7 CSA W178.2-14, Certification of Welding Inspectors.

.5 National Association of Architectural Metal Manufactures (NAAMM)

.1 NAAMM MBG 531-09, Metal Bar Grating Manual.

.2 NAAMM MBG 532-09, Heavy Duty Metal Bar Grating Manual.

.3 NAAMM MBG 534-14, Metal Bar Grating Engineering Design Manual.

.4 NAAMM AMP 555 92, Code of Standard Practice for the Architectural Metal Industry.).

.6 National Ornamental & Miscellaneous Metals Association (NOMMA)

.1 NOMMA Guideline 1: Joint Finishes, 1994.

.7 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: convene pre-installation meeting in accordance with Section 01 31 19 – Project Meetings to:

.1 Verify project requirements.

.2 Review project schedule milestones.

.3 Review installation and substrate conditions.

.4 Review coordination requirements with other building subtrades, and identify items to fabricate and supply to be built-in or cast in place.

.5 Review manufacturer's installation instructions.

1.4 ITEMS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 Supply following products for installation under other Sections:

.1 Anchor bolts, bearing plates, sleeves and other inserts to be built into concrete and masonry elements and required for anchorage and support of fabricated steel components.

.2 Fabricated steel components to be built into concrete and masonry.

.2 Supply instructions and templates as required for accurate setting of inserts and components.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and data sheets.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada and indicate VOC content for:

.1 Finishes, coatings, primers and paints.

.2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures:

.1 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.3 For items where design is delegated to fabricator or otherwise require structural design (e.g., guardrails and handrails, supports for rooftop mechanical installations, etc.), provide shop drawings signed and sealed by Professional Engineer responsible for the design and registered in Province of Work.

.1 Conform to the requirements of Section 01 35 01 – Delegated Design.

1.6 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Detail and fabricate metal fabrications in accordance with the NAAMM AMP 555.

.4 Perform Work to the highest standard of modern shop and field practice, by personnel experienced in this Work. Accurately fit joints and intersecting members in true planes with adequate fastening. Build and erect the Work plumb, true, square, straight, level, accurate to the sizes shown, and free from distortion or defects.

.5 Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.6 Welding: Qualify procedures and personnel according to the following:

.1 Welders shall be qualified by Canadian Welding Bureau for classification of work being performed.

.2 The fabricator shall be certified to CSA W47.1, Division 1 or 2.1.

.3 Welding shall be inspected by inspectors certified to inspection to CSA W178.2.

.4 Resistance welding: to CSA W55.3.

.5 Fusion welding: to CSA W59.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Exercise due care in storing, handling and erecting all materials and support all materials properly at all times so that no piece will be bent, twisted or otherwise damage structurally or visibly.

.2 Correct damaged material and where the Consultant deems damage irreparable, replace the affected items at no additional expense to the Consultant or Owner.

.3 Apply protective covering to face of all exposed finished metalwork before it leaves shop, covering to remain until item installed.

.4 Fabricate large assemblies so they can be safely and easily transported and handled to their place of installation.

1.8 JOB CONDITIONS

.1 Coordinate this Work with the remainder of the Work and exercise the necessary scheduling to ensure that all Work is carried out and all items incorporated during the appropriate construction phase.

.2 Provide instructions and drawings to other trades for setting bearing plates, anchors blots, and other members that are built in to work of other trades.

.3 Protect other Sections of the Work from damage by this Section of the Work.

Part 2 Products

2.1 MATERIALS

.1 Steel channels, angles and plates: to CSA G40.20/G40.21, Grade 300W.

.2 Hollow structural sections: to CAN/CSA G40.20/G40.21, Grade 350W, Class C.

.3 Steel and checkered plate: to CAN/CSA G40.20/G40.21, Grade 260 W.

.4 Rolled steel sections: to CSA G40.21, 350W.

.5 Steel pipe: to ASTM A53/A53M standard weight (Schedule 40), galvanized finish.

.6 Metal bar grating: to ANSI/NAAMM MBG 531, steel, Type W 19 4, with checkered plate nosings.

.7 Floor Plate: Steel safety plate meeting ASTM A786, 5 mm thickness, checkered pattern 45º to edge of steel plate, raised 28 mm x 8 mm elongated pips at 90º to each other, 22 mm offset x 45 mm on centre.

.8 Gratings, Treads and Landings:

.1 Type: W-19-4 welded steel construction in accordance with NAAMM MBG 531, as follows:

.1 Rectangular bearing bars: 25 mm x 5 mm at 30 mm O/C.

.2 Cross bars: 32 mm^2 at 100 mm on centre.

.2 Anchorage: Welded.

.3 Finish: Hot dipped galvanized 550 g/m^2 in accordance with ASTM A653.

.4 Surface: Plain.

.5 Fasteners: 6 mm diameter galvanized fasteners, located over end and mid span (if any) bearing locations in accordance with NAAMM MBG 531.

.6 Nosings: Landings and stair nosings, manufacturer's standard welded checker plate nosing to manufacturer's standard.

.7 Acceptable materials:

.1 McNichols Co.

.2 IKG Industries (Harsco Canada).

.3 Fisher and Ludlow (Harris Steel Ltd.).

.9 Welding materials: to CSA W59.

.10 Welding electrodes: to CSA W48 Series.

.11 Fasteners: bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws, and machine bolts.

.12 Unfinished fasteners: In areas not exposed to the public, use unfinished bolts conforming to ASTM A307, Grade A, with hexagon heads and nuts. Supply bolts of lengths required to suit the thickness of the material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.13 Finished fasteners:

.1 In areas exposed to public use, bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts to be hot dip galvanized in accordance with ASTM A153/A153M.

.2 For joining stainless steel components use stainless steel fasteners of same type.

.3 Structural bolts: to ASTM F3125.

.14 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.15 Shop coat primer: to CAN/CGSB-1.40.

.16 Galvanized primer: one component, ready-mixed zinc rich, to AASHTO M 300.

.17 Galvanizing: hot-dip method with minimum zinc coating of 705 g/m2 conforming to ASTM A123 for fabricated assemblies. ASTM A153/A153M for all hardware (average zinc coating of 381 g/m2). Hot dip galvanize after fabrication.

.18 Pipe Bollards:

.1 Fabricate pipe bollards from Schedule 40 steel pipe.
.2 Concrete Fill: comply with requirements of Section 03 30 00.

.19 Bollard Covers:

.1 Provide 3mm thick high-density polyethylene blow molded bollard cover over each exterior steel pipe bollard, diameter of cover to suit bollard size minimum 1.2 m high. Cover to be complete with 2-3M Scotchlite reflecting strips near top.

.2 Colours to be selected by Consultant from manufacturer's standard.

.3 Provide 2 foam strips crisscrossed over the top of bollard and install cover over bollard.

.4 Basis-of-Design: Post guard by Encore Commercial Products Inc., or similar with same or better physical properties.

2.2 EXTERIOR TACTILE WARNING STRIPS

.1 Supply cast iron tactile warning plates that meet AODA, CSA B651 and ISO 23599 requirements. Supply to concrete trade as required in accordance with the project schedule for casting-in.

.2 Basis-of-Design:

.1 Neenah Cast Iron Tactile Warning Plate (Straight), natural finish; or approved similar to same affect with same or better physical properties and meeting the same standards.

2.3 FABRICATION - GENERAL

.1 Fabricate and finish railings and guardrails in accordance with CISC Guide for Specifying Architecturally Exposed Steel: to AESS 3 Feature Elements (see Table 1 – AESS Category Matrix).

.2 Fabricate and finish ladders in accordance with CISC Guide for Specifying Architecturally Exposed Steel: to AESS 1 Basic Elements (see Table 1 – AESS Category Matrix).

.3 Other welded joints: Finish #1, to NOMMA Guideline 1: Joint Finishes.

.4 Fabricate in compliance with Ontario Building Code and amendments.

.5 Fabricate stairs in accordance with NAAMM AMP 510.

.6 Fabricate railings in accordance with NAAMM AMP 521 as applicable.

.7 Fabricate gratings to NAAMM MBG 531.

.8 Shop-fabricate sections as large and complete as practicable.

.9 Fabricate in compliance with Ontario Building Code and amendments.

.10 Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

.11 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.1 Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and

overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature change (Range): 100 deg F (38 deg C).

.12 Shear and punch metals cleanly and accurately. Remove burrs.

.13 Ease exposed edges to a radius of approximately 0.794 mm (1/32 inch), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.14 Remove sharp or rough areas on exposed traffic surfaces.

.15 Weld corners and seams continuously to comply with American Welding Society (AWS) recommendations, and the following:

.1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

.2 Obtain fusion without undercut or overlap.

.3 Remove welding flux immediately.

.4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

.16 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

.17 Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

.18 Shop Assembly: preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

.19 Cut, reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware, screws, and similar items.

.20 Ensure exposed welds are continuous for length of each joint.

.21 Grind or file exposed welds and steel sections smooth and flush with adjacent surfaces. Weld locations not to be visible after application of paint finishes.

.22 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.23 Accurately form connections with exposed faces flush; mitres and joints tight.

.24 Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

.25 All welding is to be performed by CWB Certified Welders.

2.4 MISCELLANEOUS FABRICATIONS

.1 Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.

.2 Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated as required to complete work.

.3 Signage support: Fabricate anchors, hangers, suspension and support for signage as indicated. Provide temporary spacers where required for maintaining correct placement during construction. Signage support shall be smooth steel members.

.4 Support framing for suspended toilet partitions: Structural channel and angle framing continuously welded and securely anchored to structure above. Design framing and anchorage to support assembly dead loads and live loads, and lateral loads attributable to misuse and vandalism. Finish: Prime painted.

.5 Sleeves:

.1 Supply pipe sleeves to respective trade for building in. Where required install pipe sleeves as they pass through walls, floors and ceilings.

.2 Size sleeves to clear insulated surfaces, pipes and conduits with 13 mm minimum, unless noted otherwise.

.3 Terminate sleeves flush with surfaces of walls and ceiling and extend 38 mm above floors, unless noted otherwise.

.4 Seal and make waterproof and watertight sleeves of type suitable for application after installation of conduit or conductors.

.5 For sleeves, other than waterproofed sleeves seal or pack void between sleeve and pipe, conduit, or penetrations in accordance with ULC requirements for hourly rating of surface being penetrated.

.6 Anchors and Fastening:

.1 Provide all anchor bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings, where necessary to secure metal and wood to concrete, masonry or steel work, other than anchorages specified under other Sections. Fasten all components and items securely. Provide adequate reinforcing to ensure safe rigid installation. Set anchor bolts in locations indicated and spaced as shown or, if not shown, as may be required for properly securing Work.

.2 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.3 Use self-drilling expansion type concrete anchors for attaching to masonry and concrete.

.4 Do not secure items to steel deck.

.5 Use steel beam clamps of 2 bolt design to transmit load to beam web. Do not use 'C' and 'I' clamps.

.7 Inserts and Hangers:

.1 Install inserts, hangers, and supports. Make inserts drilled lug or expansion type.

.2 Before openings are cut through structure, obtain Consultant's written acceptance for procedures, locations and reinforcements required.

.3 Do not weld hangers to structural steel members or burn holes in structural steel.

.4 Do not suspend items from steel decking.

.8 Toilet Partitions, Mechanical Equipment and Supports:

.1 Design supplementary steel structures to support toilet partitions and mechanical equipment in locations and elevations indicated on the Drawings.

.2 Obtain dimensions and weights of partitions and equipment from reviewed architectural and mechanical shop drawings and product data.

.3 Arrangement in accordance with Drawing details where indicated, and in accordance with partition and equipment supplier's recommendations.

.4 Submit shop drawings of support for each type and size of partition and equipment, designed, reviewed and sealed by a professional engineer. Information should include:

.1 Partition and Equipment loads and connections.

.2 Connect details to building structure.

.3 Locations of partitions and equipment.

.4 Loads at each connection point to building structure.

.5 Refer to technical specification Sections for particular requirements. Toilet Partitions and Mechanical equipment requiring supplementary steel supports include but are not limited to:

.1 Toilet Partitions.

.2 Piping.

.3 Equipment support beams.

.4 Ductwork.

.9 Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitred joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

.10 Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

.11 Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.

2.5 LOOSE BEARING AND LEVELLING PLATES

.1 Provide loose bearing and levelling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

.2 Galvanize plates after fabrication.

2.6 LOOSE STEEL LINTELS

.1 Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

.2 Weld adjoining members together to form a single unit where indicated.

.3 Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 203 mm (8”), sized as follows:

Span	Minimum Loose Lintel Size	
	76 mm (3”) Masonry	90 mm (3 ½”) Masonry
1000 mm (40”)	L76 X 76 X 4.8	L89 X 89 X 6.4
2000 mm (80”)	L76 X 76 X 6.4	L89 X 89 X 6.4
3000 mm (120”)	L127 X 76 X 7.9 LLV	L127 X 89 X 9.5 LLV

.4 Galvanize loose steel lintels located in exterior walls.

2.7 ROUGH HARDWARE

.1 Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.

2.8 HSS POSTS

.1 Provide HSS post reinforcement within partitions, cabinet work, and screens where indicated. Provide concealed mounting plates top and bottom. Allow for structural deflection at top of connection.

2.9 CHANNEL FRAMES

.1 Fabricate frames from steel, sizes of channel and opening as indicated.

.2 Weld channels together to form continuous frame for jambs and head of openings, sizes indicated.

2.10 SLEEVES

.1 Supply sleeves where vertical railing members are supported from concrete construction.

.2 Fabricate of minimum 3 mm thick steel, open at top, capped at bottom, at least 100 mm deep unless otherwise shown, and sized to provide 8 mm grout space around perimeter of insert.

2.11 BOLLARDS

.1 Unless otherwise indicated, provide 150 mm diameter steel pipe extending 1200 mm above grade complete with anchor plate and 4 bolts.

.2 Install bollard covers in accordance with manufacturer’s printed installation instructions and illustrations.

2.12 FINISHES

.1 Prior to applying primer or other finishes, clean metal to equivalent of commercial sand blast SSPC SP6, remove sandblast in residue.

.2 Galvanizing (all exterior steel, including steel incorporated into construction of exterior wall assemblies): hot-dip method with minimum zinc coating of 705 g/m^2 conforming to ASTM A123 for fabricated assemblies. ASTM A153/A153M for all hardware (average zinc coating of 381 g/m^2).

.1 Hot dip galvanize all exterior metal fabrications and metal fabrications incorporated into the exterior wall and roof assemblies; hot dip galvanize after fabrication.

.3 Touch-up galvanized surfaces with zinc rich coating, to ASTM A780: DOD-P-21035 zinc rich paint, minimum DFT 8 mils.

.4 Galvanized primer: one-component, ready-mixed zinc rich primer, to AASHTO-M-300 or DOD-P-21035.

.5 Isolation Coating: Apply an isolation coating to contact surfaces in contact with cementitious materials, wood materials and dissimilar metals.

.6 Shop coat primer: to CAN/CGSB-1.40.

.7 Finish paint finishes: to Section 09 91 00 - Painting.

.8 Schedules for finish and colour: refer to Exterior Materials and Finish Schedule.

2.13 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.14 SHOP PAINTING

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2, minimum SSPC SP6.

.2 Apply one coat of shop primer to metal items, with exception of galvanized or concrete encased items.

.3 Apply two coats of primer of different colours to parts inaccessible after final assembly.

.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.5 Do not paint surfaces to be field-welded.

.6 Prime after fabrication and before damage to surface occurs from weather or other exposure.

.7 Protect machine finished or similar surfaces that are not to be coated, but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by the Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 ERECTION

.1 Erect to Ontario Building Code 2012 and amendments, CSA S16, and Code of Standard Practice for Structural Steel.

.2 Install in required locations using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs and railings to structure.

.3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.4 Install Work in accordance with manufacturer's or fabricator's (as applicable) written instructions, job-specific details, and Drawings.

.5 Do welding work in accordance with CSA W59 unless specified otherwise.

.6 Supply finished items to be built in to those trades along with instructions for proper installation.

.7 Apply architectural metalwork using hidden mechanical fasteners. Installation shall be by skilled Architectural metalworkers experienced in highest quality work.

.8 Fasteners to draw adjoining sections together in proper, true alignment, and are capable of field adjustment.

.9 All fasteners, mountings to be non-loosening and installed so that they will be hidden at completion.

.10 Install all Work to true, straight lines, accurate to profile, all properly aligned.

.11 Isolate dissimilar metals in a manner approved by the Consultant to prevent electrolytic action or corrosion.

.12 Install finish hardware supplied under other Sections required for completion of components of this Section.

.13 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.14 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.15 Make field connections with high tensile bolts to CSA S16 and weld to prevent loosening.

.16 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.17 Touch up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.18 Repair galvanized areas damaged by welding, flame cutting or during handling, transport or erection in accordance with ASTM A780. Touch up with organic zinc rich paint to DOD P 21035 zinc rich paint, minimum DFT 8 mils.

3.3 PIPE BOLLARDS

.1 Anchor bollards in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

.2 Fill bollards solidly with concrete, mounding top surface.

.3 Install pipe bollard covers in accordance with manufacturer’s specifications, and secure permanently in place.

3.4 MISCELLANEOUS ITEMS

.1 Supply and install miscellaneous metal fabrications as indicated or specified, or as otherwise required in accordance with the design intent of the project.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.7 SCHEDULE

.1 The schedule given hereunder shall not be considered to represent a complete schedule of all metal fabrications required in the Work. Thorough scrutiny of the complete Contract Documents is required to obtain a complete schedule of metal fabrications required in the Work.

.2 Include miscellaneous framing and supports that are not included under work indicated on structural drawings.

.3 Provide the following metal fabrications:

- .1 Metal Fabrications Shown on Structural Drawings:
  - .1 Refer to Drawings; fabrication work includes, but is not limited to:
  - .2 Masonry support steel.
  - .3 Mechanical roof support piers and framing.
  - .4 Additional steel components shown on structural Drawings.
- .2 Overhead doorframes, including jamb extensions and mounting plates.
- .3 Bollards (hot dipped galvanized after fabrication at all exterior locations).
- .4 Steel angle at perimeter of louvres and exterior metal doorframe openings.
- .5 Hoist beams for elevators, to CSA S16 as required; coordinate sizing and requirements with elevator installers.
- .6 Structural supports for glass partitions, and guardrails.
- .7 Steel grating and guardrails (exterior hot dipped galvanized after fabrications).
- .8 Vanity and counter support framing
- .9 Steel angle or bent steel plate jambs at curtain wall, window, and entrance framing.
- .10 Bent steel plate at sill of door openings to roof from Penthouse, galvanized checkered plate.
- .11 Steel corner guards and wall guard at Garbage Rooms.
- .12 Lateral support angles at top of masonry partitions and walls in accordance with details on structural drawings, where not provided by Section 04 20 00 - Unit Masonry.
- .13 Miscellaneous steel angles, plates, and lintels required but not included on structural Drawings.
- .14 Reinforcement at interior stud partitions.
- .15 Other metal fabrications indicated and not specifically covered in other Sections.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 20 00 – Finish Carpentry.

.2 Section 06 40 00 – Architectural Woodwork.

.3 Section 07 52 16 - Two-Ply Conventional Membrane Roof.

.4 Section 07 55 52 - Two-Ply Protected SBS Membrane Roof.

.5 Section 07 62 00 – Sheet Metal Flashing and Trim.

.6 Section 09 21 16 – Gypsum Board Assemblies.

.7 Section 09 91 00 – Painting.

.8 Section 10 28 13 – Toilet and Bath Accessories.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM C954-11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.3 ASTM F1667-15, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.2 American Wood Preservers Association (AWPA):

.1 AWPA Book of Standards, 2012

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA O80 Series-08, Wood Preservation

.2 CSA O112 Series-M1977 (R2006), CSA Standards for Wood Adhesives.

.3 CSA O121-08, Douglas Fir Plywood.

.4 CSA O141-05 (R2009), Softwood Lumber.

.5 CAN/CSA O325-07, Construction Sheathing.

.4 National Lumber Grading Association (NLGA):

.1 Standard Grading Rules for Canadian Lumber 2010.

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DEFINITIONS

.1 For the purpose of this project the following definitions shall apply:

.1 Structural Light Framing: All horizontal and vertical load bearing framing including members indicated as “Studs” on the drawings shall be considered to be No. 2 Grade and better and shall be used throughout unless prior approval is provided by the Consultant.

.2 Stud Framing: Vertical framing members of non-load bearing wall systems may be considered as No. 3 or Stud Grade and may only be used where the consultant gives prior approval. Use of No. 3 and Stud Grade framing material will not be allowed for any horizontal applications.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and datasheets.

.2 Submit MSDS sheets or official manufacturer literature stating no urea-formaldehyde was used in the manufacturing of composite wood.

1.5 QUALITY ASSURANCE

.1 Lumber identification: Grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: Grade mark in accordance with applicable CSA standards.

.3 Each board of fire retardant treated material to shall bear the ULC label indicating 'Flame Spread Classification' (FSC), and smoke developed.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver wood products bundled or crated to provide adequate protection during transit. Inspect wood products for damage upon delivery and remove and replace damaged materials.

.2 Store materials a minimum of 150 mm off the ground on blocking. Keep materials under cover and dry. Provide for air circulation within and around stacks and under temporary coverings.

.3 Protect sheet materials to prevent breaking of corners and damage to surfaces.

Part 2 Products

2.1 GRADES

.1 Use CLS grade marked lumber conforming to the Standard Grading Rules for Canadian Lumber published by the National Lumber Grades Authority.

2.2 LUMBER

.1 Lumber: Stud Grade to CAN/CSA O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:

.1 Moisture Content: maximum 8% at time of installation.

.2 Maximum moisture content when used for attachment of drywall: 8%.

.3 Stud (No.3) Grade or better, having the following minimum properties:

.1 Sizes: 38 mm or 89 mm wide by maximum 140 mm depth as noted on drawings.

.2 Bending at extreme fibre (F_b): 7.0 MPa.

.3 Longitudinal shear (F_v): 1.0 MPa.

.4 Compression parallel to grain (F_c): 7.0 MPa.

.5 Compression perpendicular to grain (F_{cp}): 5.3 MPa.

.6 Tension parallel to grain (F_t): 3.2 MPa.

.7 Modulus of elasticity (E/ E_{O5}): 9000/5500 MPa.

.8 Finger jointed material will not be acceptable without written acceptance from the Consultant.

.2 Lumber: Structural Light Framing and Structural Joists and Planks to CAN/CSA O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:

.1 Moisture Content: maximum 8% at time of installation.

.2 Maximum moisture content when used for attachment of drywall: 8%.

.3 Grade: No. 2 or better, and having the following minimum properties:

.1 Sizes: 38 mm or 89 mm wide by depth as indicated on drawings.

.2 Bending at extreme fibre (F_b): 11.8 MPa.

.3 Longitudinal shear (F_v): 1.0 MPa.

.4 Compression parallel to grain (F_c): 11.5 MPa.

.5 Compression perpendicular to grain (F_{cp}): 4.6 MPa.

.6 Tension parallel to grain (F_t): 5.5 MPa.

.7 Modulus of elasticity (E/ E_{O5}): 9500/6500.

2.3 PANEL MATERIALS

.1 Plywood: Douglas Fir (DFP) Exterior Grade to CSA O121, waterproof glue bond, thickness as indicated on drawings.

.2 Fire Rated Plywood, to CSA O325, Class A fire retardant produced under Performance Standard PS-1, certified by the American Plywood Association.

.1 Acceptable Materials:

.1 Purekor Fire Retardant Plywood.

.3 Fire-Rated Materials: ULC-labelled fire resistant, provide grade stamp or certification as noted for fire retardant pressure treated lumber.

.4 Panels shall have no added urea formaldehyde.

2.4 MISCELLANEOUS LUMBER

.1 Provide lumber for support or attachment of other construction, including furring, blocking, nailing strips, ground, rough bucks, cants, curbs, fascia, backing sleepers, and similar members.

.2 Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on drawings.

.3 Moisture Content: 19% maximum for lumber items not specified to receive wood preservative treatment.

.4 Grade: for dimension lumber sizes provide No. 2 or Standard grade lumber per NLGA. For board-sized lumber, provide sheathing grade, S2S.

2.5 WOOD PRESSURE TREATMENTS

.1 Where lumber or plywood is indicated as preservative treated or is specified to be treated, treat in accordance with CAN/CSA O80.9M and AWPA.

.2 Wood preservatives containing arsenic or chromium are not permitted.

.3 Pressure treat above ground items with Copper Azole (CA-B) preservative to a minimum AWPA retention of 1.6 kg/m^3. After treatment, kiln-dry lumber and plywood to maximum moisture content of 19% and 15% respectively. Treat indicated items and the following:

.1 Wood cants, nailing strips, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapour barriers, and waterproofing.

.2 Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry and concrete.

.3 Wood framing members less than 460 mm above grade.

.4 Wood floor plates installed over concrete slabs directly in contact with earth.

.4 Pressure treat wood members in contact with ground or freshwater with Copper Azole (CA-B) preservative to a minimum AWPA retention of 3.4 kg/m^3

.5 Fire-Retardant Treatment: to CAN/SCA O80.9M, CAN/CSA O80.20M and CAN/CSA O80.27M, pressure impregnated, and as follows:

.1 Flame Spread Classification: FSC 25 maximum.

.2 Smoke developed of not more than: 75.

.3 Acceptable materials:

.1 Dricon FRT, by Lonza.

.2 D-Blaze Fire Retardant Treated Wood, by Viance.

.3 Pyro-Guard, by Hoover Treated Wood Products, Inc.

.6 Complete fabrication of treated items before treatment where possible. If cut after treatment apply field treatment to cut surfaces.

.7 Wood Preservatives: Maximum allowable VOC limit 350 g/L in accordance with SCAQMD Rule #1113 - Architectural Coatings.

2.6 ACCESSORIES

.1 Sealants: in accordance with Section 07 92 00 – Joint Sealants. Maximum allowable VOC limit 250 g/L in accordance with SCAQMD Rule 1168.

.2 General purpose adhesive: to CSA O112 Series. Maximum allowable VOC limit 70 g/L in accordance with SCAQMD Rule 1168.

.3 Nails, spikes, and staples: to ASTM F1667, double hot dipped galvanized for exterior work and pressure preservative and fire-retardant treated materials; hot dipped galvanized for all other purposes.

.4 Screws for Fastening to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened; hot dipped galvanized for fastening galvanized metal.

.5 Rough Hardware (bolts, nuts, washers, etc.): Grade A low carbon steel conforming to ASTM A307 and double hot dipped galvanized steel in conformity with ASTM A123/A123M for exterior work; hot dipped galvanized for all other purposes.

.6 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.

.7 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead plugs, recommended for purpose by manufacturer; double hot dipped galvanized for exterior work; hot dipped galvanized for all other purposes.

2.7 FASTENER FINISHES

.1 Stainless steel: use type 304 or 316 stainless steel fasteners for pressure-preservative or fire-retardant wood products.

.2 Galvanizing: use hot-dipped galvanized fasteners complying with ASTM A153 and connectors complying with ASTM A653, class G185, for all other applications.

Part 3 Execution

3.1 COMPLIANCE

.1 Fabrication and installation work shall meet or exceed the requirements of Ontario Building Code, errata and amendments.

.2 Accurately frame and properly assemble rough carpentry work. Include all necessary nails or other connectors.

3.2 FASTENINGS AND ROUGH HARDWARE

.1 Unless indicated otherwise, fasten to hollow masonry units with toggle bolts; to solid masonry or concrete surfaces with expansion shields and bolts.

.2 Where screws are required use lead or inorganic fibre plugs. Wood or organic plugs not permitted.

.3 Powder actuated fasteners may be used in lieu of bolts if approved by the Consultant in writing prior to materials arriving on site.

.4 Provide all rough hardware such as nails, bolts, nuts, washers, screws, clips and strap metal.

3.3 BLOCKS, PLATES, STRAPPING AND FURRING

.1 Install wood plates where indicated. Erect plumb and true. Rigidly support and securely anchor to masonry, concrete, and metal stud framing, as required.

.2 Provide and install wood strapping or furring indicated on drawings or as required.

.3 Strapping: Shimmed out plumb, square and true to line. Use 19 mm x 64 mm at 406 mm on centre, unless indicated otherwise.

.4 Furring: As indicated.

.5 Install at least one row of solid blocking to wood stud walls not more than 2440 mm high, two rows if over 2440 mm high.

.6 Install blocking behind all sheathing and wallboard joints, and where required for items to be fixed to walls.

3.4 SHEATHING INSTALLATION

.1 Install wall sheathing horizontally to wood framing using minimum 50 mm long coated nails at 150 mm along edges and 305 mm along vertical members in the middle of the sheets.

.2 Leave 2 mm to 3 mm between sheets to allow for shrinkage of wood framing.

.3 Install blocking behind all sheathing joints.

3.5 ROOF FRAMING, PARAPETS, CANT STRIPS AND PLATES

.1 Wood exposed to weather and water shall be pressure preservative treated.

.2 Unexposed wood in contact with roofing membranes shall not be pressure preservative treated.

.3 Construct wooden roof curbs around openings in the roof for vents, ducts, and flues. Curbs to be of height that will provide a minimum projection of 200 mm above the roof membrane. Ensure base for curb is same thickness as insulation.

.4 Form sloped tops to all wood parapet plates and wood upstands more than 38 mm wide to roofs that receive metal flashings. Tops shall slope not less than 1 in 12. If details are at variance notify the Consultant prior to construction for further instructions.

.5 Provide continuous wood backing for flashings.

.6 Provide solid wood or plywood sheathing and backing, a to receive membrane and metal flashings, to roofer's requirements conforming to CRCA Manual. Fasten plywood sheathing securely to the walls of parapets with mechanical fasteners; nails will not be acceptable.

.7 Install 89 mm x 89 mm wood cant strips in lengths not exceeding 2440 mm at membrane upturns.

.8 Anchor plates for fixing cant strips at 1220 mm maximum o/c and 150 mm maximum from ends of each piece.

3.6 MISCELLANEOUS

.1 Install wood stud framing for temporary weather closures and cladding. Construct to resist wind pressures.

.2 Install bracing to masonry walls and piers during construction until structure provides sufficient lateral support.

.3 Install support for masonry lintels.

.4 Install plywood shims at window openings.

.5 Construct planter retaining walls of pressure preservative treated timbers. Treat cut ends with two heavy coats of brush applied oil borne preservative.

3.7 EXTERIOR CARPENTRY WORK

.1 Construct exterior work using hot dip galvanized nails, screws or bolts. Bolts, nuts and washers shall be hot dip galvanized.

.2 Plane all sides and backs; sand exposed faces and surfaces, round all edges to prevent checking of edges.

.3 Countersink bolts and washers, fill holes with matching wood plugs.

.4 Apply two liberal coats of clear surface applied wood preservative, allowing the first coat to soak in completely prior to applying second coat in accordance with manufacturers instructions.

3.8 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION

.1 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.

.2 Remove with fine sandpaper chemical deposits on treated wood to receive applied finish.

.3 Use only hot dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

.4 Use water borne preservative treated wood for:

- .1 Wood in contact with masonry or concrete,
- .2 Wood within 450 mm of grade,
- .3 Wood decking and fence boards,
- .4 Wood in contact with flashings
- .5 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.

.5 Use oil borne preservative treated wood for:

- .1 Wood in contact with the ground,
- .2 Wood in contact with freshwater,

.3 Landscaping timbers,

.4 Retaining walls,

.5 Piers or docks,

.6 Pilings,

.7 Bases of utility poles,

.8 Bases of fence posts.

3.9 FIRE RETARDANT TREATED WOOD INSTALLATION

.1 Install as indicated and as required by Code as directed by authorities having jurisdiction.

.2 Field Cuts:

.1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.

.2 Only end cuts, drilling holes and joining cuts are permitted.

.3 All cuts on plywood will be considered end cuts.

.4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.

.5 Pre-cut to the greatest extent possible before treating.

.3 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire resistant treated materials.

.5 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive inhibitive paint.

3.10 POWER, TELECOMMUNICATIONS AND DATA PANEL BOARDS

.1 Install 19 mm thick Fire Rated Plywood Panels on walls behind electrical, telephone and data rooms receiving wiring and equipment; minimum 1220 mm x 2440 mm panels on periphery walls over 300 mm wide, mounted 150 mm off of finished floor.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.12 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry.

.2 Section 06 40 00 – Architectural Woodwork.

.3 Section 09 00 00 - Product Finish Codes and Samples.

.4 Section 09 54 00 – Wood Grille Ceilings.

.5 Section 09 91 00 – Painting.

.6 Refer to Drawings.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A208.1-2009, Particleboard.

.2 ANSI A208.2-2009, Medium Density Fibreboard (MDF) for Interior Applications.

.3 ANSI/HPVA HP-1-2009, Standard for Hardwood and Decorative Plywood.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM E1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.

.2 ASTM F1667-17, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)

.1 AWMAC Architectural Woodwork Standards, 2nd Edition.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3-M87, Hardboard.

.5 Canadian Plywood Association (CanPly)

.1 The Plywood Handbook 2005.

.6 Canadian Standards Association (CSA International)

.1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.2 CSA O121-08(R2013), Douglas Fir Plywood, Includes Update No. 1 (2013).

.3 CAN/CSA O141-05 (R2009), Softwood Lumber.

.4 CSA O151-09, Canadian Softwood Plywood.

.5 CSA O153-13, Poplar Plywood.

.6 CSA Z760-94 (R2001), Life Cycle Assessment.

.7 National Hardwood Lumber Association (NHLA)

.1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.

.8 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2007.

.9 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)

.1 SCAQMD Rule 1113-04, Architectural Coatings.

.2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.10 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S104-10, Standard Method for Fire Tests of Door Assemblies.

.2 CAN/ULC S105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC S104.

1.3 DEFINITIONS

.1 For the purpose of this Project, the following definitions shall apply to this and related Sections:

.1 Panel Matching:

.1 Blueprint Matched: Premium grade veneers are matched for continuity of grain and colour for various size panels, doors, and transoms.

.2 Sequence Matched: Premium grade veneers are matched for colour and all panels of the same size will have continuity of grain. Other size panels must be cut during installation that may interrupt grain continuity. Doors are made from veneer of similar colour but not continuity of grain.

.3 Flitch Matched: Premium grade veneers from several flitches may be used. If more than one flitch is used, grain and colour may not be similar. Doors may not be similar grain or colour.

.2 Veneer Matching:

.1 Book Matched: Every other piece of veneer from a flitch is turned over so adjacent pieces are opened like adjacent pages in a book. The veneer joints match and create a mirrored image pattern at the joint line, yielding a maximum continuity of grain.

.2 Slip Matched: Adjoining pieces of veneer from a flitch are placed in sequence without turning over every other piece. The grain figure repeats, but joints will not show a mirrored effect.

.3 Random Matched: A random selection of individual pieces of veneer from one or more logs. Produces a “board-like” appearance.

.4 Running Matched: Non-symmetrical appearance in any single door face. Veneer pieces of unequal width. Each face is assembled from as many veneer pieces as necessary.

.5 Balance Matched: Premium grade only. Symmetrical appearance. Each face is assembled from pieces of uniform width before trimming.

.6 Centre Matched: Premium grade only. Symmetrical appearance. Each face has an even number of veneer pieces of uniform width before trimming. Thus, there is a veneer joint in the center of the panel, producing symmetry.

.7 Pair Matched: Doors may be specified as pair matched.

.8 Set Matched: Sets of doors may be specified as matching.

.9 Transom Matches:

.1 Continuous Matched: Each single piece of veneer extends from the top of the transom to the bottom of the door.

.2 End Matched: A single piece of veneer extends from the bottom to the top of the door with a mirror image at the transom.

.3 No Match: Economy grade only.

1.4 MINIMUM AESTHETIC REQUIREMENTS

.1 Obtain all Oak materials from same supplier; obtain all oak as either White Oak or Red Oak at contractor's choice, but use only one type for the Project (White or Red Oak, not both).

.2 Guardrail caps, handrails, panels, mouldings, trim, chair rails, baseboards, and other wood components, including doors, together within a room, corridor, or lobby, shall be Blueprint Matched.

.3 Doors along a corridor or within a room shall be Set Matched; pairs of doors, Pair Matched.

.4 Veneer Leaves shall be Slip Matched.

.5 Guardrail caps, handrails, trim and moulding shall be expressly selected for continuity and uniformity of finished appearance, AWMAC premium grade, meeting Blueprint Matching criteria.

1.5 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Woodwork contractor shall be an AWMAC manufacturer in good standing for 2 years minimum. Submit proof of membership in good standing to the Consultant prior to starting the project.

.3 Product Data:

.1 Indicate details of construction, profiles, jointing, fastening and other related details.

.2 Indicate materials, thicknesses, finishes and hardware.

.4 Samples:

.1 Label each sample to indicate Drawing number and room location.

.2 Submit natural wood samples unfinished and finished. For finished samples, apply stain and topcoat as specified, and allow cure before submission.

.3 Finish one side and edge of samples representing items to receive factory finishes.

.4 Submit flitch samples taken from flitches that are anticipated to best meet requirements for colour and matching for each location. Each flitch shall be given its own unique number, and those numbers selected shall be recorded in a woodwork binder, a copy of which shall be provided to the Consultant and affected subcontractors, manufacturers and suppliers.

.5 Where variations in wood and finish may occur, a minimum of three variations showing extremes that may be expected of wood finishes specified shall be submitted to the Consultant for approval. Minimum size: 12" x 20" (300 mm X 500 mm).

.6 Submit samples of high-pressure decorative laminate clad panel material laid up on specified core material, 300 mm x 600 mm for each type, colour, pattern, and surface finish.

.7 Submit 300 mm x 300 mm samples of each type of solid wood or plywood to receive stain or natural finish.

.8 Submit three samples 20" (500 mm) minimum length of all mouldings and/or moulding assemblies to be used for the Project. These shall be full size and finished as specified in the Contract Documents.

.9 Submit 215 mm x 280 mm samples of panel products for each factory applied finish system.

.5 Closeout Submittals:

.1 Provide operations and maintenance data in accordance with Section 01 78 00 – Operation and Maintenance Manuals.

.6 Certifications and Reports:

.1 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

.2 Test and Evaluation Reports: submit certified test reports for composite wood from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.7 Shop Drawings:

.1 Indicate materials, factory finishes, thicknesses, and hardware. Include plans, elevations, sections, and details at the following drawing scales:

.1 Plans and elevations – 1:20.

.2 Sections – 1:10.

.3 Details – 1:2.

.2 Indicate construction details, locations of built in items, connections, attachments, anchorage and location of exposed fastenings, as applicable.

1.6 QUALITY ASSURANCE

.1 Comply with the requirements of Section 01 45 00 – Quality Control.

.2 Work in accordance with Grades specified in AWMAC Standards (NAAWS):

.1 Refer to architectural dwgs for required AWMAC grades for each piece.

.1 Economy Grade: NOT IN USE.

.2 Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well defined degree of control over a project’s quality of materials, workmanship, or installation.

.3 Premium Grade: Selectively used in the most visible and high-profile areas of a project, such as reception counters, boardrooms, and executive areas, providing the highest level of quality in materials, workmanship, and installation.

.4 Refer to architectural millwork schedule for required grade for each proposed piece.

.2 Woodwork contractor shall be an AWMAC manufacturer in good standing for a minimum of 2 years.

.3 Architectural woodwork shall be manufactured and installed to the current AWMAC Standards (NAAWS). Work that does not meet the AWMAC’s STANDARDS (NAAWS), shall be replaced, reworked and/or refinished by the architectural woodwork contractor, to the approval of the Consultant, at no additional cost to the Owner.

.4 Maintain a copy of the specified AWMAC Manual at the factory, readily available for duration of work.

.3 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

.4 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

.5 Reference to grade in this Section shall be as defined in the AWMAC Manual. Minimum grade acceptable for this Project: Premium Grade.

.6 Installer shall be responsible for supplying field dimensions that will affect the work of this Section.

.7 Source Limitations: Engage a qualified woodworking firm to assume undivided and complete responsibility for the fabrication and installation of interior architectural woodwork and finish carpentry, having completed work similar in material, design, and extent to that indicated, and whose work has resulted in construction with a record of successful in-service performance, as well as sufficient production capacity to produce required work.

.8 Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated and whose work has resulted in construction with a record of successful in-service performance.

.9 Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.10 Site Supervision: Provide full time site supervision for work of this section; supervisor shall be directly employed by the installer and shall have the authority to receive, represent, and make decisions for work of the Project.

.11 Identify architectural woodwork materials with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.7 DELIVERY, STORAGE AND HANDLING

.1 The Architectural Woodwork Manufacturer and the Contractor shall be jointly responsible to make certain that architectural woodwork is not delivered until the building and storage areas are sufficiently dry so that the architectural woodwork will not be damaged by excessive changes in moisture content.

.2 Architectural woodwork delivery, storage and handling shall be in accordance with Section 2 Care and Storage of the AWS.

.3 Delivered materials which are damaged in any way or do not comply with these specifications will be rejected by the Consultant and shall be removed from the job site and replaced with acceptable materials.

1.8 PROJECT CONDITIONS

.1 Maintain a minimum 430 lx (40 f.c.) illumination on surfaces and areas where work is being installed.

.2 Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings where architectural woodwork is indicated to fit walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

.3 Established Dimensions: Establish dimensions and proceed with fabricating architectural woodwork without confirmed field measurements where field measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

1.9 COORDINATION

.1 Coordinate provision of concealed blocking or supports.

.2 Ensure that back-priming of finish carpentry surfaces concealed after installation, has been performed as specified in Section 09 91 00 – Painting, prior to installation.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Softwood lumber: unless specified otherwise, spruce-pine-fir species, S4S, average moisture content of 6% and maximum of 9% for interior work, an average moisture content of 12% and maximum of 15% for exterior work, in accordance with following standards:

.1 CAN/CSA-O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 AWS premium grade, moisture content as specified.

.2 Hardwood lumber: Hardwood: to Canadian Hardwood Lumber Association, kiln dried to maximum moisture content of 8%, selected to meet AWS Premium grade, White Oak or Red Oak (Contractor’s choice, but only one type not both to be used for Project), Rift Sawn, in accordance with following standards:

.1 National Hardwood Lumber Association (NHLA).

.2 AWS premium grade, moisture content as specified.

2.2 PANEL MATERIAL

.1 Panel Materials: Provide panel materials meeting requirements for moisture content and grades in accordance with AWMAC requirements, and as specified below. Panel products must be manufactured with no added urea-formaldehyde.

.1 Softwood Plywood: Meeting CSA O121, cross-banded, sanded G2S, thickness as indicated.

.2 Hardwood plywood: to CSA O115, of thickness indicated, and maximum size sheets application and as follows:

.1 AWS premium grade, for stained finish.

.2 Face Veneer: A Veneer Grade:

.1 Minimum 150 mm flitch width.

.2 Continuous across face of panel, no end matching allowed.

.3 White Oak or Red Oak (Contractor’s choice, but only one type not both to be used for entire Project), rift cut, single sheet match and symmetry.

.4 Minimum veneer thickness, 0.50 mm.

.5 Vertical grain direction.

2.3 PREFABRICATED MOULDINGS

.1 Prefabricated Mouldings: refer to Drawings and PRODUCT FINISH CODES AND SAMPLES.

2.4 ACCESSORIES

.1 Fasteners: to suit size and nature of components being fastened.

.2 Nails: to ASTM F1667; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.3 Wood screws: plain, type and size to suit application.

.4 Splines: wood.

.5 Adhesive: structural wood adhesive recommended by adhesive manufacturer for bonding surfaces and conditions.

2.5 FABRICATION

.1 Fabricate moulding and trim to dimensions, profiles and details indicated.

.2 Ease edges of trim to 1/16” (1.5 mm) radius unless otherwise indicated.

.3 Fabricate items rigid, plumb and square, as detailed, with tight, bevelled, hairline joints. Sand work smooth, set all nails and screws.

.4 Back-out or groove backs of flat trim members and kerf backs of other wide, flat members except for members with ends exposed in finished work.

.5 Assemble casings in shop except where shipping limitations require field assembly.

.6 Assemble mouldings in shop to maximum extent possible. Miter corners in shop and prepare for field assembly with bolted fittings designed to pull connections together.

.7 Countersink bolts and washers; fill holes with matching wood plugs; use hidden fastening system or structural adhesives for finish hardwood construction. Meet aesthetic requirements specified.

.8 Scarf joints in guardrails, handrails, moulding and running trim.

2.6 SHOP FINISHING – FINISH CARPENTRY

.1 General: Finish wood trim at fabrication shop as specified in this Section. Defer only final touch-up, cleaning, and polishing until after installation. Refer to PRODUCT FINISH CODES AND SAMPLES.

.2 Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to each unit of work.

.1 Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood trim. Apply two coats to end-grain surfaces.

.3 Stained Finish for hardwood materials:

.1 Grade: AWMAC premium.

.2 Finishes: in accordance with approved samples.

.3 Staining: some shall be stained a rich cherry colour and some shall be stained brown walnut in accordance with approved samples, and as directed by Consultant; Consultant will advise which stain colour shall be used in each instance.

.4 Sheen: Satin gloss, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

Part 3 Execution

3.1 JOB CONDITIONS

.1 Job Conditions for installation of architectural woodwork shall be in accordance with applicable AWMAC requirements.

3.2 INSPECTION

.1 Contractor, Owner, and Consultant to visit site at 80% completion and note state of Work and finishes in the various areas in which cabinet and millwork to be installed.

.2 Ensure surfaces are ready to receive Work. All surfaces of other Work to be finished and painted before being built-over or covered in any way or millwork installed.

3.3 PREPARATION

.1 Obtain measurements from site.

.2 Check access to ensure large pieces of work can be safely handled to their place of final installation.

.3 Protect finished surfaces and materials of other trades from damage.

.4 Ensure services and roughing-in that affect or are connected to or through this work are complete and acceptable.

.5 Before installation, condition wood guardrail caps, hand railings and trim to average prevailing humidity conditions in installation areas.

.6 Before installing architectural wood guardrail caps, hand railings and trim, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.4 INSTALLATION

.1 Do finish carpentry to Premium Quality Standards of the AWS, except where specified otherwise. Comply with Part 9 of the Ontario Building Code 2012 and amendments.

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

.4 Install work to applicable AWMAC and Quality Assurance requirements.

.5 Install all cabinetwork in its indicated locations, plumb, level, and true.

.6 Anchor to structure using fastening devices and hardware consistent with the building materials encountered. Do not use wood or plastic plugs. Provide wall strapping as required.

.7 Wood doorframes: set frames with plumb sides, level heads and sills, and secure.

.8 Handrails and Standing and Running Trim and Mouldings:

.1 Grade: AWMAC premium grade.

.2 Assemble wood guardrail caps, handrails, trim and moulding, and complete fabrication at project site to the extent not completed in the shop.

.3 Install level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

.4 Scribe and cut to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

.5 Anchor to blocking built in or directly attached to substrate. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

.6 For shop-finished items, use filler matching finish of items being installed.

.7 Handrails and Standing and Running Trim and Moulding: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches (2400 mm) long except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

.1 Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.

.2 Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

.8 Touch up finishing work specified in this Section after installation of wood trim. Fill nail holes with matching filler where exposed.

.1 Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

.9 Fastening:

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.

.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.7 SCHEDULE

.1 Refer to Section 09 00 00 - Product Finish Codes and Samples.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications.

.2 Section 06 10 00 – Rough Carpentry.

.3 Section 06 20 00 – Finish Carpentry.

.4 Section 09 00 00 - Drawings.

.5 Section 09 91 00 – Painting.

.6 Division 23 Mechanical: Sinks in countertops.

.7 Division 26 Electrical.

.8 Division 27 Communications.

.9 Division 28 Electronic Safety and Security.

.10 Refer to schedules on Drawings.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A208.1-09, Particleboard.

.2 ANSI/HPVA HP-1-2016, Standard for Hardwood and Decorative Plywood.

.3 ANSI/BHMA A156.9-2010 Cabinet Hardware.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A123/A123M-15 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A240/A240M-16a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.3 ASTM E1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.

.4 ASTM F1667-15, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)

.1 AWMAC Architectural Woodwork Standards, Edition 2 (2014) plus all errata through April 29, 2016.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 12.1-2017, Safety Glazing.

.5 CSA Group (CSA)

.1 CSA O121-08(R2013), Douglas Fir Plywood.

.2 CSA O141-05(R2014), Softwood Lumber.

.6 National Electrical Manufacturers Association (NEMA)

.1 ANSI/NEMA LD3-2005, High-Pressure Decorative Laminates (HPDL).

.7 National Hardwood Lumber Association (NHLA)
.1 Rules for the Measurement and Inspection of Hardwood and Cypress 2011.

.8 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2010.

.9 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)

.1 SCAQMD Rule 1113-11, Architectural Coatings.

.2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 DEFINITIONS

.1 For the purpose of this Project, the following definitions shall apply to this and related Sections:

.1 Panel Matching:

.1 Blueprint Matched: Premium grade veneers are matched for continuity of grain and colour for various size panels, doors, and transoms.

.2 Sequence Matched: Premium grade veneers are matched for colour and all panels of the same size will have continuity of grain. Other size panels must be cut during installation that may interrupt grain continuity. Doors are made from veneer of similar colour but not continuity of grain.

.3 Flitch Matched: Premium grade veneers from several flitches may be used. If more than one flitch is used, grain and colour may not be similar. Doors may not be similar grain or colour.

.2 Veneer Matching:

.1 Book Matched: Every other piece of veneer from a flitch is turned over so adjacent pieces are opened like adjacent pages in a book. The veneer joints match and create a mirrored image pattern at the joint line, yielding a maximum continuity of grain.

.2 Slip Matched: Adjoining pieces of veneer from a flitch are placed in sequence without turning over every other piece. The grain figure repeats, but joints will not show a mirrored effect.

.3 Random Matched: A random selection of individual pieces of veneer from one or more logs. Produces a “board-like” appearance.

.4 Running Matched: Non-symmetrical appearance in any single door face. Veneer pieces of unequal width. Each face is assembled from as many veneer pieces as necessary.

.5 Balance Matched: Premium grade only. Symmetrical appearance. Each face is assembled from pieces of uniform width before trimming.

.6 Centre Matched: Premium grade only. Symmetrical appearance. Each face has an even number of veneer pieces of uniform width before trimming. Thus, there is a veneer joint in the center of the panel, producing symmetry.

.7 Pair Matched: Doors may be specified as pair matched.

.8 Set Matched: Sets of doors may be specified as matching.

.9 Transom Matches:

.1 Continuous Matched: Each single piece of veneer extends from the top of the transom to the bottom of the door.

.2 End Matched: A single piece of veneer extends from the bottom to the top of the door with a mirror image at the transom.

.3 No Match: Economy grade only.

1.4 AESTHETIC CRITERIA

.1 Obtain hardwood plywood and lumber materials from the same supplier.

.2 Panels, mouldings, trim, chair rails, ceilings, counters, risers, doors, and other wood components together within a room, corridor, or lobby, shall be Blueprint Matched.

.3 Doors along a corridor or within a room shall be Set Matched; pairs of doors, Pair Matched.

.4 Veneer Leaves shall be Slip Matched.

.5 Trim and moulding shall be selected for continuity and uniformity of finished appearance, AWS premium grade, meeting Blueprint Matching criteria.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings; submit Shop Drawings and show the following:

.1 Show location of each item, dimensioned plans and elevations, large scale details, attachment devices, and other components.

.2 Show details of construction, profiles, jointing, fastening and other related details.

.3 Show materials, thicknesses, finishes and hardware.

.4 Show locations and sizes of cut-outs and holes for plumbing fixtures and other items installed in architectural woodwork.

.4 Samples.

.1 Submit 2 finished samples, 610 mm x 610 mm of each finish to be applied at the factory, to the Consultant for approval. Where materials are being matched, verify that specified materials match existing prior to submitting samples.

.2 Alternative cabinet hardware from that specified shall be submitted to the Consultant for approval.

.3 Reviewed samples shall become the standard for the work.

.5 Certifications:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.6 Closeout Submittals:

.1 Project Record Sheet: Submit to the Consultant 2 copies of the project record sheet identifying the project title and address, Owner, Consultant, and Architectural Woodwork Subcontractor. Indicate also materials and finishes used for architectural woodwork and whether shop finished or site finished and by whom. Include type and source of all cabinet hardware and any special items used under architectural woodwork.

.2 Submit in accordance with Section 01 78 00 – Closeout Submittals.

1.6 COORDINATION

.1 Coordinate with other trades as required to maintain construction schedule, and to provide supports and blocking as required.

1.7 QUALITY ASSURANCE

.1 Manufacturer/fabricator/millworker: shall be a member in good standing of the Architectural Manufacturers Association of Canada (AWMAC) through one of its Chapters.

.2 Work of this Section shall be Certified in accordance with the AWMAC Guarantee and Inspection (GIS) program.

.3 Architectural Woodwork Quality Standards (AWS) and Errata shall be used to establish the minimum level of quality for this project.

.4 Execute the work of this Section by a member of AWMAC with five years' experience in work of comparable complexity and scope.

.5 Any reference to Custom or Premium grade in this specification or on the Drawings shall be as defined in the AWS.

.6 Any item not explicitly given a specific quality grade shall be Custom grade as defined in the AWS.

.7 A copy of the AWS shall be made readily available for reference purposes on the job site.

.8 References in this specification to part and item numbers mean those parts and items contained within the AWS.

.9 Perform the Work in accordance with the definition of 'Good Workmanship' as defined in the AWS.

.10 Remove and replace finish carpentry Work which does not conform to the AWS

.11 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.12 Sustainable Standards Certification: Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA Z809 or FSC or SFI.

.13 Hardwood plywood, Douglas fir plywood, and particleboard shall meet or exceed the applicable CSA and ANSI standards, as follows:

- .1 Hardwood plywood: to ANSI/HPVA HP-1, Standard for Hardwood and Decorative Plywood.
- .2 Douglas Fir Plywood: to CSA O121, Douglas Fir Plywood.
- .3 Particleboard: to ANSI A208.1-, Particleboard.

.14 Cabinet hardware shall be Grade 1 as defined by ANSI/BHMA A156.9-2010 Cabinet Hardware unless explicitly specified otherwise.

.15 Mock-ups:

- .1 Comply with requirements of Section 01 11 00 – Summary of Work, item 1.6 PRECONSTRUCTION FIELD MOCK-UP.
- .2 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .1 For items not included in preconstruction field mock-up, shop-prepare one of each type of cabinetry and millwork required for Project.
  - .2 For preconstruction field mock-up, Provide as required for a complete installation at model suite unit.

.3 Provide minimum 1 week of notice in advance of mock-up reviews, and allow 24-hours for inspection of each mock up by Consultant before proceeding further with this work.

.4 When accepted, mock up will demonstrate minimum standard for this work. Mock up may remain as part of finished work.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Protect millwork against dampness and damage during and after delivery.

.2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Storage and Handling Requirements:

.1 Store materials off ground and protected from the weather, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect architectural woodwork from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

1.9 PROJECT CONDITIONS

.1 Comply with the AWS requirements for care and storage for optimum temperature and humidity conditions. Maintain a minimum 430 lx (40 f.c.) illumination on surfaces and areas where work is being installed.

.2 Where work is indicated to be fitted to other construction, check dimensions of other construction by field measurement before fabrication; show recorded field measurements on final Shop Drawings. Coordinate fabrication schedule with construction schedule and progress to avoid delay of Work.

.3 Where field measurements cannot be made without delaying the Work, guarantee dimensions, and proceed with fabrication without field measurements, coordinating as required with other construction and site conditions to ensure that actual dimensions correspond to guaranteed dimensions.

1.10 WARRANTY

.1 Provide manufacturer’s standard 10 year warranty for solid surfacing against defects in materials and workmanship; including material and labour to repair or replace defective materials.

.2 Contractor agrees to correct any deficiencies found in the work performed for a period of 2-years from date of Substantial Performance.

Part 2 Products

2.1 GENERAL

.1 Wood Materials and Hardware, basis-of-design: refer to Schedules and Legends on Drawings.

.2 General Schedule:

.1 Refer to millwork schedule on Drawings.

2.2 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 15% or less in accordance with following standards:

.1 CSA O141.

.2 CAN/CSA-Z809 or FSC or SFI certified.

.3 NLGA Standard Grading Rules for Canadian Lumber.

.2 Hardwood lumber: Hardwood: to Canadian Hardwood Lumber Association, kiln dried to maximum moisture content of 8%, selected to meet AWS Premium grade, White Oak or Red Oak (Contractor's choice, but only one type not both to be used for Project), Rift Sawn, in accordance with following standards:

.1 Refer to DRAWINGS and schedules on drawings.

.2 AWS premium grade, moisture content as specified.

.3 Panel materials: Provide panel materials meeting requirements for moisture content and grades in accordance with AWS Custom Grade requirements, and as specified below. Manufacture panel products without added urea formaldehyde.

.4 Exterior Grade Douglas fir, to CSA O121, 'A/A' veneer, cross banded, sanded, G2S, thickness as indicated, or required to suit construction and withstand loads without deflection (at countertops under high-pressure decorative laminate and at casework bases).

.5 Softwood veneer plywood: exterior grade Douglas fir to CSA O121, Grade 'A' veneer, cross banded, sanded G2S, thickness as indicated, or as required to suit construction and withstand loads without sagging.

.6 Hardwood plywood: to CSA O115, of thickness indicated, and maximum size sheets application and as follows:

.1 Refer to DRAWINGS and schedules on drawings.

.2 AWS premium grade, for stained finish.

.3 Face Veneer: A Veneer Grade:

.1 Minimum 150 mm flitch width.

.2 Continuous across face of panel, no end matching allowed.

.3 White Oak or Red Oak (Contractor's choice, but only one type not both to be used for Project), rift cut, single sheet match and symmetry.

.4 Minimum veneer thickness, 0.50 mm.

.5 Vertical grain direction.

.7 Particleboard: to ANSI A208.1, Industrial Grade M-2 or better, minimum 720 kg/m^3 density and Grade M-3, minimum 750 kg/m^3 particleboard for countertops, shelves and chemical-resistant HPL applications; clearly mark panels with grade mark in visible location; extruded particleboard having loose cores with voids will not be permitted; having no added urea formaldehyde.

.8 High-Pressure Decorative Laminate (HPL): to ANSI/NEMA LD3 and European Standard EN438: 2016; Grades and application in accordance with applicable AWS requirements and as follows:

.1 Colours: Refer to DRAWINGS and schedules on drawings.

.2 Constructed of multiple layers of phenolic resin-saturated kraft paper in combination with a layer of decorative thermosetting plastic-saturated paper, fused together under heat and pressure.

.3 Horizontal General Purpose Grade (HGS): thickness of 1.2 mm ±0.12 mm, used on the following: Horizontal surfaces, unless specified otherwise.

.4 Vertical General Purpose Grade (VGS): thickness of 0.7 mm ±0.10 mm, used on the following:

.1 Vertical surfaces, unless specified otherwise.

.2 Exposed portions of case bodies, including ends, divisions and bottoms.

.3 Exposed shelves.

.4 Casework Doors: exposed and semi-exposed surfaces.

.5 Drawer Faces: exposed and semi-exposed surfaces.

.5 Laminate backer grade (BKL): thickness of 0.5 mm ±0.10 mm, used on the following:

.1 Concealed surface of casework backs.

.2 Concealed surfaces, unless specified otherwise.

.3 Colours: as selected by Consultant from manufacturer's full range.

.9 Low Pressure Decorative Laminate (LPL): decorative thermosetting laminate moulded and cured at pressures in general of 2.8 x 106 pascals, to ANSI/NEMA LD3, in accordance with applicable AWS requirements, and as follows:

.1 Thickness: 0.5 mm minimum.

.2 Wear Resistance: 400 cycles minimum.

.3 Colours: Refer to DRAWINGS and schedules on drawings.

.10 Melamine Component Panel (MCP): to ANSI-A208.1:

.1 Core: particleboard, grade M-2 or M-3 as required for location and use; no added urea formaldehyde when tested in accordance with ASTM E1333.

.2 Thermally fused melamine to ANSI/NEMA LD3, 2 sides, colour and pattern selected by Consultant from manufacturer's full range.

.1 Melamine impregnated papers thermally fused under pressure.

.2 Thickness: 0.5 mm minimum.

.3 Wear Resistance: 400 cycles minimum.

.4 Colours: Refer to DRAWINGS and schedules on drawings.

.3 Adhesives used to fabricate laminated assemblies containing these products must contain no urea formaldehyde.

.11 Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ASNI Z124.3, for Type 5 or Type 6, without a pre-coat finish:

.1 Colour Basis of Design: Refer to Drawings and schedules on drawings.

.2 Acceptable Materials:

.1 Avonite, Avonite, Inc.

.2 Corian, Dupont Polymers.

.3 Surell, Formica Corporation.

.4 Gibraltar, Wilsonart International.

.5 Cambria

.12 Quartz Surface: Homogeneous mixture containing 93% pure 7% resin binders and pigments.

.1 Colour Basis of Design: Refer to Drawings and schedules on drawings

.2 Acceptable Materials:

.1 Caesarstone.

.2 Zodiaq, by DuPont.

.3 Silestone, by Cosentino.

.4 Cambria.

.13 Edging: materials and profiles as indicated.

.1 Solid wood edging: Hard Maple species, clear finished.

.2 PVC edging shall be solid, high impact, purified, solid through-colour, and acid resistant. Colour as selected by Consultant.

.3 High Pressure Decorative Laminate Edging:

.1 Horizontal General Purpose Grade (HGS): thickness of 1.2 mm ±0.12 mm, colour and finish to match surface finish.

.2 Post-forming (VGP): maximum thickness of 1 mm, colour and finish to match surface finish.

.14 Fasteners:

.1 Nails and staples: to ASTM F1667; galvanized to ASTM A123/A123M for humid areas and for treated lumber; plain finish elsewhere.

.2 Wood screws: brass, type and size to suit application.

.3 Particleboard screws: for use with particleboard core substrates (e.g., LPL Component Panel, or HPL with particleboard core); low root and high thread, purpose made for installation in particle board, size to suit application.

.4 Screws and bolt caps to cover heads of fasteners used to secure work to walls - pop on screw covers for 6 mm diameter screws – fabricator’s choice, as approved by Consultant.

.5 Bolts, nuts, washers, screws, cup washers for removal panels, etc., all hot dip heavy zinc coated.

.6 Draw Bolt Fasteners, available from various sources.

.15 Splines: wood.

.16 Gable connectors: joint connector bolts and caps to suit application, zinc-coated steel, available from various sources.

.17 Connectors: zinc-coated steel, types to suit application, available from various sources.

.18 Spacers: Rigid PVC to size and profile indicated.

.19 Adhesives, use commercial-grade, brush-applied adhesives only, and recommended by manufacturer for application and conditions:

.1 Adhesives shall contain no added urea formaldehyde.

.2 Decorative laminate: polyvinyl acetate or aliphatic resin in accordance with manufacturer's recommendation for curing under pressure for bonding to wood cores, water-resistant type.

.3 Edge banding: Thermoplastic hot melt, synthetic resin suitable for applying thin veneer wood edge banding and film overlays.

.4 Quartz Mounting Adhesive: Provide structural grade '50 year' silicone or epoxy adhesive.

.1 Acceptable silicone manufacturers:

.1 Dow Corning.

.2 GE Sealants.

.2 Acceptable epoxy manufacturers:

.1 Cambria Two Part Acrylic Adhesive.

.2 Akemi North America.

.3 Bonstone Material Corporation.

.4 Tenax USA.

.5 Quartz Surface Adhesive:

.1 Provide epoxy or polyester adhesive of a type recommended by manufacturer for application and conditions of use.

.2 Adhesive which will be visible in finished work shall be tinted to match quartz Surface.

.20 Door and drawer bumpers: thin self-adhesive bumpers available from various sources.

.21 Wall bumpers: bumpers about 6 mm thick from various sources.

.22 Joint Sealants: in accordance with Section 07 92 00 - Joint Sealants.

2.3 CABINET WORK AND MILLWORK

.1 Work shall conform to AWS Custom Grade requirements.

.2 Door and Drawer Bumpers: Self-adhesive type approximately 6 mm diameter clear silicone bumpers for all cabinet work doors and drawer faces, two per door and drawer, placed at door top and bottom and drawer top.

.3 Refer to Drawings for construction and details of casework and millwork.

2.4 HARDWARE

.1 Casework hardware: to ANSI/BHMA A156.9, Grade 1 unless otherwise explicitly specified. Hardware shall include all fasteners, mounting hardware, and accessories as required for complete installations. Supply hardware as indicated.

.1 Basis-of-Design Products: Refer to Drawings.

.1 European hinges, self-closing with integrated soft-closing function, 100 degrees opening: steel, screw-on mounting, nickel-plated.

.2 Overhead cabinet hinges.

.3 Cam locks: die-cast zinc, nickel finish.

.4 Drawer and Door Pulls: finish and design as selected by Consultant; refer to Drawings.

.5 Heavy-duty drawer slides: full extension, 182 kg load rating, rated for frequent use, 25 mm over travel, non-disconnect, self-closing, touch release, polymer ball bearings, zinc finish.

.6 Garbage recycling drawer hardware.

.7 Adjustable shelves: stainless steel pin rests and 7 mm diameter socket collar inserts, nickel finish, for steel pin rests; drill holes in millwork to accept collars at spacing directed by Consultant or as indicated (confirm spacing with Consultant prior to drilling).

.8 Counter support brackets.

.9 Recessed grommets (cable management).

.10 Coat hooks: finish and design as selected by Consultant.

.11 Nylon Cabinet Levelers / Glides.

.2 HWD1: Contemporary right-angled Richelieu pull: Product number BP873224195; Center to Center: 224 mm; Length - Overall Dimensions 254 mm; Finish: Brushed Nickel.

.3 HWD2 (at Spa): Product number BP5016192195; Center to Center: 192 mm; Length - Overall Dimensions 233 mm; Finish: Brushed Nickel.

2.5 FABRICATION – GENERAL

.1 Flush overlay cabinet doors and drawer fronts as detailed.

.2 Fabricate gables and edges meeting walls oversize to allow for scribing to fit on site.

.3 Assemble Work with flush butt hairline corners and joints. Cut-outs for services to be done on site during installation. No hairline cracks will be allowed in the face area of cabinet work modules unless approved in writing by Consultant.

.4 Carefully fit, cope or mitre and well glue-up Joints. There shall be no end wood visible on finished surfaces.

.5 Glue, dowel, mortise, lock joint or dado all cabinet work and cabinet work. Do not use staples. Nailing and screws are acceptable.

.6 Set nail heads in finished surfaces. Countersink screws and bolts, except those detailed to be exposed, and fill holes with edge grain wood plugs to match colour and grain.

.7 Blocking, framing, web frames to be solid lumber.

.8 Provide solid wood edge strips in all doors and cases to receive hardware. Rebate and pressure glue to core.

.9 Cut and adapt all Work to receive hardware.

.1 Drill and prepare end gables for insert type shelf standards on gables.

.2 Install all finishing hardware and fittings in shop.

.3 Fittings which may be susceptible to damage during shipping and installation may be installed after millwork installed on site.

.10 Ensure adjacent part of continuous work match in colour and pattern.

2.6 FABRICATION – PLASTIC LAMINATE

.1 AWS Quality Grade Premium.

.2 Install high pressure and low-pressure laminate as indicated; colours per Schedules.

.3 Comply with NEMA LD3, Annex 'A', and Manufacturer's Technical Data Sheets and fabrication guidelines.

.4 Obtain governing dimensions before fabricating items that are to accommodate or abut appliances, equipment and other materials.

.5 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.6 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.

.7 Drill oversized holes for screws or bolts. Screws or bolts to be slightly countersunk into the face side of a laminate-clad substrate.

.8 Provide cores of not less than 19 mm nominal thickness.

.9 All inside corners to have a minimum of 1/8" (3.18 mm) radius, and all edges to be routed smooth.

.10 Apply backing sheet to laminated flatwork. Supply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by facing sheet.

.11 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.12 Locate joints at 2400 mm to 3000 mm oc. At 'L' shaped corners mitre plastic laminate to outside corners. Accurately fit member together to provide tight and flush butt joints, in true planes. Provide 6 mm blind spline and approved type draw bolts. Provide 1 draw bolt for widths up to 150 mm. For width exceeding 150 mm, provide draw bolts at maximum 250 mm centres. Colour match adjoining units.

.13 Provide cut outs as required for inserts, fixtures and fittings. Use radiused corners and chamfer edges around cut outs to avoid chipping laminate.

.14 Doors: apply matching laminated plastic to both outside and inside faces of door panels.

.15 At other locations, apply laminate backing sheet to reverse side of core of plastic laminate work.

.16 Apply laminated plastic liner sheet to interior of cabinetry.

.17 Post form laminate work to details indicated. Provide same core and laminate profiles to provide continuous support and bond for entire surface.

.18 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

.19 Use hot-pressing method for adhering plastic laminate to substrate to greatest extent possible to minimize field application. Use only brush-applied adhesives suitable to the surfaces to be bonded.

2.7 FABRICATION – SOLID SURFACING

.1 Comply with Manufacturer's Technical Data Sheets and fabrication guidelines.

.2 Fabricators to be certified by the manufacturer.

.3 Factory fabricate components to sizes and shapes indicated, in accordance with approved shop drawings.

.4 Provide factory cutouts for plumbing fittings and accessories as indicated on the drawings, and per approved shop drawings.

.5 Finish bowl or sink rims using manufacturer's recommendations. Repair or reject defective and inaccurate work.

.6 Cut and finish component edges and ends with clean, sharp returns. Fabricate radii and contours to templates. Repair or reject and replace defective and inaccurate work.

.7 Edge and exposed end treatment: straight edge detail unless noted otherwise; comply with manufacturer's product data and as indicated on the reviewed shop drawings.

.8 Coved backsplashes: Shop fabricate 3/8" (9 mm) or other radius cove at intersection of counters and backsplashes.

2.8 FABRICATION - QUARTZ STONE

.1 Provide quartz stone countertops complete with backsplash where indicated.

.2 Fabricate components in shop as recommended by material manufacturer to sizes and profiles indicated.

.3 Unless otherwise indicated provide 19 mm thick material, built-up to 38 mm thick at exposed edges.

.4 Provide factory cut openings in countertops for appliances and plumbing fixtures. Confirm opening sizes and locations prior to fabrication

2.9 SHOP FINISHING

.1 Finishes: refer to Drawings.

.2 Stained Finish for hardwood materials:

.1 Grade: AWMAC premium.

.2 Finishes: in accordance with approved samples.

.3 Staining: some shall be stained a rich cherry colour and some shall be stained brown walnut in accordance with approved samples, and as directed by Consultant; Consultant will advise which stain colour shall be used in each instance.

.4 Sheen: Satin gloss, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

.3 Shop fabricate and finish to extent possible.

.4 Make allowances for door openings and access routes.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Coordination

.1 Coordinate with other trades as required for complete installation and as required to maintain project schedule.

3.3 MILLWORK LIGHTING

.1 Millwork contractor shall coordinate installation with electrical contractor and SpecTech of the following:

.1 Under-cabinet lights, interior designer light fixtures, 3-inch recessed pot lights, receptacles, and data/TV.

.2 Millwork contractor to provide openings for outlet boxes in millwork and coordinate wiring (by electrical / SpecTech) to ensure a clean inconspicuous installation.

.3 Millwork contractor to provide LED tape light and wiring within millwork to a connection point. Electrical contractor to make final connection. Coordination required between trades.

.4 Millwork contractor to provide LED puck lights and wiring within millwork to a connection point. Electrical contractor to make final connection. Coordination required between trades.

3.4 INSTALLATION

.1 Install architectural woodwork to indicated AWS Grade, minimum Custom Grade, Premium Grade where indicated.

.2 Install prefinished millwork at locations shown on drawings. Install work plumb, true and square, neatly scribed to adjoining surfaces.

.3 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.4 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.5 Fasten and anchor millwork securely.

.1 Anchor to floor, walls, or ceiling using heavy duty fastening devices and hardware consistent with the building materials encountered. Do not use wood plugs. Do not use plastic plugs for ceilings or walls. Provide wall strapping as required.

.6 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.

.7 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.8 At junctions of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants. Apply joint sealants at other locations as indicated.

.9 Shop-apply laminated plastic to units as indicated.

.1 Adhere laminated plastic over entire surface.

.2 Make corners with hairline joints.

.3 Use full sized laminate sheets.

.4 Make joints only where approved by Consultant.

.5 Slightly bevel arises.

.10 For site application, offset joints in plastic laminate facing from joints in core.

.11 Plastic Laminate:

.1 Manufacturer's Instructions:

.1 Comply with manufacturer's data sheets, printed installation requirements, standard details, and specifications.

.2 Install work plumb, true and square, neatly scribed to adjoining surfaces.

.3 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.4 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.

.5 Provide cut-outs for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.6 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.

.7 Protection:

.8 Cover finished laminated plastic veneered surfaces with heavy Kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove until immediately before final inspection.

.9 Cleaning:

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Perform care and cleaning with NEMA LD3, Annex B.

.3 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.12 Solid Surfacing:

.1 Install per manufacturer's published technical briefs, guidelines, and specifications. Installers to be certified by the manufacturer.

.2 Substrates and Supports:

.1 Slabs for horizontal surfaces, such as countertops, to be supported not less than every 18" (45.7 cm), or as otherwise indicated on Shop Drawings.

.3 Install work plumb, true and square, neatly scribed to adjoining surfaces, and in accordance with reviewed shop drawings and product data.

.4 Form field joints (if required and indicated on the reviewed shop drawings), using manufacturer's recommended procedures. Joints in finished work to be as inconspicuous as possible.

.5 Adhere under-mount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.

.6 Adhere top-mount sinks/bowls to countertops using manufacturer's recommended adhesives and colour matched silicone sealants.

.7 Provide backsplashes and side splashes where indicated on the drawings. Backsplash and front edge treatment to be integral with countertop.

.8 At junction of backsplash, and adjacent wall finish, apply small bead of silicone sealant.

.9 Keep components clean during installation. Remove adhesives, sealants, and other stains. Buff out minor scratches to match adjacent undamaged surfaces. Replace defective Work at no expense to Owner.

.13 Quartz Stone:

.1 Install per manufacturer's published technical briefs, guidelines, and specifications. Installers to be certified by the manufacturer.

.2 Substrates and Supports:

.1 Slabs for horizontal surfaces, such as countertops, to be supported not less than every 18" (45.7 cm).

.3 Install work plumb, true and square, neatly scribed to adjoining surfaces, and in accordance with reviewed shop drawings and product data, laminated with adhesive to 19 mm thick exterior grade veneer core plywood.

.4 Form field joints (if required and indicated on the reviewed shop drawings), using manufacturer's recommended procedures. Joints in finished work to be as inconspicuous as possible.

.5 Adhere under-mount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.

.6 Adhere top-mount sinks/bowls to countertops using manufacturer's recommended adhesives and colour matched silicone sealants.

.7 Provide backsplashes and side splashes where indicated on the drawings. Backsplash and front edge treatment to be integral with countertop.

.8 At the junction of backsplash, and adjacent wall finish, apply small bead of silicone sealant.

.9 Keep components clean during installation. Remove adhesives, sealants, and other stains. Buff out minor scratches to match adjacent undamaged surfaces. Replace defective Work at no expense to Owner.

.14 Supply and install hardware required for the completion of architectural woodwork, including, without limitations, adjustable shelf supports and cabinet hinges, catches, pulls, drawer accessories, bumpers, drawer slides and closet hanger bars, and similar items. Install millwork hardware in the shop wherever possible. Install millwork hardware secure, plumb, level, true to line, and in accordance with the hardware manufacturers' printed instructions. Cut and fit to millwork for proper installation and operation. Provide smoothly operating units free from binding. Clean and adjust hardware for proper operation.

.15 Where access is required to valves and other mechanical and electrical components located within cabinetwork, install removable plywood access panels of size required to permit safe and easy access, and secure with 4 screws.

3.5 ADJUSTING

.1 During installation and again at Substantial Performance, adjust all hardware and operating parts as necessary to ensure smooth and proper operation.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 07 26 16 - Air and Vapour Membranes.

.3 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM C167-09, Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations.

.2 ASTM C553-13, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.3 ASTM C665-12, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.4 ASTM C1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

.5 ASTM F1667-11ae1, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.2 Canadian Gas Association (CGA)

.1 CAN/CGA B149.1-15, Natural Gas and Propane Installation Code.

.2 CAN/CGA B149.2-15, Propane Storage and Handling Code.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Standard Method of Test For Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

.3 CAN/ULC S604:2016, Standard for Factory-Built Type A Chimneys..

.4 CAN/ULC S702-14, Standard for Thermal Insulation Mineral Fibre for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and data sheets for each type of insulation material to be incorporated into the Work, indicating the following:

.1 Physical properties, performance criteria, R-values, fire performance characteristics, sound transmission ratings, conformance to applicable Code requirements.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Comply with the requirements of Section 01 91 00 - Envelope Performance Requirements.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver insulation and accessories in original unopened packaging or cartons bearing manufacturer's seals and labels.

.2 Store materials under cover on raised platforms, away from moisture. Keep dry at all times.

Part 2 Products

2.1 SEMI-RIGID INSULATION

.1 Fibrous mineral wool semi-rigid insulation: Unfaced, preformed rigid fibrous mineral slag board insulation in accordance with CAN/ULC S702 and as follows:

.1 Type IVB to ASTM C612.

.2 Thermal Resistance: RSI 0.75/25.4 mm minimum.

.3 Combustion Characteristics: non-combustible to CAN/ULC S114.

.4 Flame Spread: '0'; Smoke Developed: '0'; to CAN/ULC S102.

.5 Density, to ASTM C303: ≥ 70 kg/m^3.

.6 Edges: square.

.7 Size: 406 mm x 1220 mm x thicknesses as indicated on Drawings.

.8 Basis-of-Design:

.1 Rockwool CavityRock, or similar by Thermafiber or Johns Manville, with same or better physical properties and performance characteristics.

2.2 BATT INSULATION

.1 Fibrous mineral wool batt insulation:

.1 Un-faced preformed fibrous rock wool insulation meeting the requirements of ULC S702; having maximum flame spread and smoke developed of 20/20 in accordance with CAN/ULC S102 and being non-combustible in accordance with CAN/ULC S114 and as follows:

.1 Type: 1.

.2 Thermal Resistance: RSI 0.75/25.4 mm minimum.

.3 Width: to friction fit in stud spaces.

.4 Thickness: minimum 89 mm to fill a minimum of 90% of the cavity thickness.

.5 Nominal density: 40 kg/m^3.

.6 Basis-of-Design:

.1 Rockwool AFB Acoustical Fire Batt, or similar by Thermafiber or Johns Manville, with same or better physical properties and performance characteristics.

2.3 ACCESSORIES

.1 Insulation clips:

.1 99% thermally-efficient, purpose-made, gas-fired direct-fasten type anchor, consisting of high-density polyethylene (HDPE) shaft and integrated washer/cap with steel pin tip. Shaft point designed to pierce rigid and semi-rigid insulations.

.2 Anchor washer to have 60mm (2-3/8”) holding diameter. Anchor shaft length to match insulation thickness.

.3 Anchor tip to have 50mm (2”) spiral steel stud pins of zinc plated heat-treated carbon steel to penetrate through the gypsum sheathing and securely fasten anchor into steel studs.

.4 Fasteners to be colour coded to substrate applications.

.1 White Fasteners: Concrete and concrete block.

.2 Black Fasteners: Steel stud.

.5 Basis-of-Design:

.1 Ramset T3 Insulfast System by ITW Construction Products, as available through Action Fasteners or HD Supply Brofasco.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed installation instructions and technical datasheets.

3.2 SEQUENCING

.1 Ensure that materials that will be covered by installation of insulation have ben reviewed and accepted by the Consultant prior to installing insulation.

3.3 PREPARATION

.1 Verify all in-wall construction is complete before beginning installation.

.2 Install insulation after building substrate materials are dry.

.3 Ensure substrate materials are properly installed and complete before beginning installation.

3.4 INSTALLATION

.1 Install semi-rigid insulation as indicated snug and tight.

.2 Install batts between framing members, structural components and other items snug and tight.

.3 Cut and trim batts neatly to fit spaces. Use batts free from ripped or damaged back and edges.

.4 Do not compress insulation to fit into spaces.

.5 Install batt insulation where indicated with continuous vapour retarder on the warm side of the insulation in accordance with ASTM C1320.

.6 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.7 Where recommended by insulation manufacturer in their technical datasheet, keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC S604 Type A chimneys and CAN/CGA B149.1 and CAN/CGA B149.2 Type B and L vents.

.8 Fill cavities completely, full depth and width.

.9 Hold insulation in position with clips, wires or as recommended by manufacturer when insulation is installed in horizontal locations.

.10 Do not enclose insulation until it has been reviewed by Consultant.

.11 Fasteners:

.1 In accordance with insulation manufacturer's recommended spacing and as required to suit project design requirements.

.2 Minimum spacing of fasteners to be not less than 5 equally spaced insulation fasteners per 610mm x1220mm (24" x 48") insulation board area: Position one fastener 3" from each corner of each board and one in the center of each board (dice 5 pattern).

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 07 50 – Cutting and Patching.

.2 Section 03 30 00 – Cast-In-Place Concrete.

.3 Section 07 81 00 – Applied Fireproofing.

.4 Section 09 21 16 – Gypsum Board Assemblies.

.5 Section 21 05 10 – Firestopping.

.6 Divisions 21, 22 and 23 Mechanical.

.7 Division 26 Electrical.

.8 Other Sections as required by Ontario Building Code.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A1008/A1008M-15, 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 E119-16, Standard Test Methods for Fire Tests of Building Construction and Materials.

.4 ASTM E1966-15, Standard Test Method for Fire-Resistive Joint Systems.

.5 ASTM E2174-14b, Standard Practice for On-Site Inspection of Installed Fire Stops.

.6 ASTM E2307-15b, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus

.7 ASTM E2393-10a(2015), Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

.2 Firestop Contractors International Association (FCIA)

.1 FCIA Firestop Manual of Practice - 6th Edition (MOP).

.2 FM 4991, Standard for the Approval of Firestop Contractors, 2013.

.3 International Firestop Council (IFC)

.1 Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs).

.4 International Code Council (ICC) / International Building Code (IBC)

.1 2012 IBC, Chapter 7.

.5 Underwriter's Laboratories of Canada (ULC)

.1 ULC Guide No. 40 U19, Firestop Systems; ULC Category Code Number XHEZC.

.2 CAN/ULC S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials.

.3 CAN/ULC S102-11, Standard Method of Tests for Surface Burning Characteristics of Building Materials and Assemblies.

.4 CAN4 S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.

.5 CAN/ULC S115-11, Standard Method of Fire Tests of Fire stop Systems.

.6 CAN/ULC S702-14, Standard for Thermal Insulation Mineral Fibre for Buildings.

.7 ULC S702.2-15, Mineral Fibre Thermal Insulation for Buildings, Part 2: Application Guidelines.

.8 ULC S1001-11, Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems.

.6 Underwriters Laboratories Inc. (UL)

.1 ANSI/UL 1479, Standard for Fire Test of Through-Penetration Firestops, 2015.

.7 National Fire Protection Agency (NFPA)

.1 NFPA (Fire) 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials, 2006 Edition.

1.3 REGULATORY REQUIREMENTS

.1 Work of this Section shall comply with the following:

.1 FCIA Firestop Manual of Practice (MOP).

.2 Ontario Building Code 2012 and amendments (OBC).

.3 National Fire Code of Canada 2015 and amendments (NFC).

.4 2012 IBC, Chapter 7 (IBC).

.2 In cases of conflict, the more stringent requirement applies as decided by Consultant at sole discretion.

.3 Building services that penetrate either a membrane forming part of an assembly required to have a fire-resistance rating, or a fire separation, shall be tightly fitted or sealed by a firestop system that conforms to CAN/ULC S115 and that has an F-rating at least equal to the fire protection rating required for closures in fire separations.

.4 Building services that penetrate a horizontal membrane forming part of a horizontal assembly required to have a fire-resistance rating, or a fire separation, shall be sealed by a firestop system that conforms to CAN/ULC S115 and that has an FT-rating at least equal to the fire resistance rating of the assembly.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant in accordance with Section 01 32 16 – Construction Progress Schedule to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building trades.

.4 Review manufacturer's installation instructions, and warranty requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.1 Not later than 30 working days following Award of Contract, submit a schedule and shop drawings, including room numbers from the Contract Drawings. Indicate ULC assembly number for each condition, required temperature rise and flame rating, hose stream rating, thickness, installation methods and materials of firestopping and smoke seals, damming materials, reinforcements, anchorages and fastenings, size of opening, adjacent materials and number of penetrations. Include manufacturer’s printed instructions for each type of penetration.

.2 Where possible determine thickness to be applied from tests of assemblies identical to the assembly to be protected, conducted in accordance with CAN/ULC S101.

.3 Engineering Judgements: where a UL / ULC / c-UL Design (assembly number) has not been issued, obtain an engineering judgement from the system manufacturer for a solution relevant to the job conditions involved, and obtain approval of the Authorities Having Jurisdiction.

.1 Determine system from available engineering studies, or correspondence with the labelling agency indicating the effect of the differences on the fire separation of the assembly. Confirm acceptance of system by Authorities Having Jurisdiction in writing.

.2 Obtain and submit fire stop system manufacturer's engineering judgement(s) meeting the requirements of Authorities Having Jurisdiction.

.3 Engineering judgements shall comply with "Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs)."

.2 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Quality Control.

.1 Contractor shall obtain a training letter from the firestop system manufacturer, and submit it to Consultant prior to firestop installation.

.2 Submit copies of engineering judgments approved by local authorities having jurisdiction to Consultant prior to installation.

.3 The firestopping system manufacturer shall submit a letter of certification to the Contractor, certifying that all firestopping has been installed in compliance with the approved ULC design specifications for each type of penetration. Forward one copy to Consultant, and include one copy in each maintenance manual specified in Section 01 78 20.

.1 The 'Certificate of Substantial Performance' shall not be issued until Consultant has received the manufacturer's letter of certification from the Contractor indicating that all fire-stopping applications comply with the tested assemblies of the manufacturer.

.4 Submit the manufacturer's engineering judgment identification number(s) and Shop Drawing details when no ULC or cUL system is available for an application. Engineering judgments must include the Contract name and number, and the Contractor's name.

.5 For those firestop applications that exist, for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests shall be submitted to local Authorities Having Jurisdiction, with a copy to Consultant, for their review prior to installation. Engineering judgment Drawings must follow the requirements set forth by the IFC.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Company or person specializing in fire stopping installations, and approved by the manufacturer with minimum 5-years' documented experience.

.2 Company or person shall be a member in good standing of the Firestop Contractors International Association (FCIA).

.2 Use materials and methods of determining required thickness of application that have the full acceptance of Authority Having Jurisdiction.

.3 Use materials tested to CAN/ULC S115. Assemblies containing the materials shall be in accordance with assemblies tested and approved by agencies acceptable to Authority Having Jurisdiction.

.4 Single Source Responsibility:

.1 Obtain through-penetration firestop and joint systems for each kind of penetration and construction condition From a single source of manufacture and installation responsibility.

.2 To the extent possible, firestop and smokeseal products shall be supplied by a single manufacturer and installed by a qualified FCIA installer for entire Contract (the Work).

.5 The manufacturer's direct technical representative (not distributor or agent) shall be on-site during the initial installation of the firestop systems to provide training to the installer’s personnel in the proper product selection and installation procedures.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling, and unloading:

.1 Deliver, store and handle materials in accordance with Section 01 61 00 –Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC markings.

.2 Storage and Protection:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.3 Use stock before its expiration date.

1.8 PROJECT CONDITIONS

.1 Install firestopping and smokeseals materials only when the areas in which they are scheduled are closed-in and protected from dampness.

.2 Environmental Limitations: Install firestopping and smokeseals systems when ambient or substrate temperatures are within temperature and moisture limits permitted by firestopping and smokeseals system manufacturers or when substrates are not wet due to rain, frost, condensation, or other causes.

.3 Ventilate firestopping and smokeseals systems in accordance with manufacturer's written instructions by natural means or forced air circulation where natural means are not adequate.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 3M Canada Inc.
.2 A/D Fire Protection Systems Inc.
.3 Firestop Systems Inc.
.4 Hilti Canada Ltd.
.5 Nuco Self Seal Firestopping Products.
.6 Owens Corning.
.7 Specified Technologies Inc.
.8 Tremco Ltd.

2.2 PERFORMANCE AND DESIGN CRITERIA

.1 Delegated Design Requirements: Design firestopping and smokeseals required by the Contract Documents to meet fire ratings indicated, and in accordance with requirements of the Ontario Building Code 2012 and amendments.

.2 Performance Requirements: Manufacturer shall design proprietary assemblies to withstand the listed ratings in accordance with the National Building Code, Underwriters Laboratories Canada, and authorities having jurisdiction, and as follows:

.1 Provide through-penetration firestop and joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of assembly penetrated:

.1 Fire resistance rated load bearing walls, including partitions, with fire protection rated openings.
.2 Fire resistance rated non-load bearing walls, including partitions, with fire protection rated openings.
.3 Fire resistance rated floor assemblies.

.2 F-Rated Systems: Provide through penetration firestop systems with F-ratings indicated, as determined by ULC S115, but not less than that equalling or exceeding fire resistance rating of constructions penetrated.

.3 T-Rated Systems: For the following conditions, provide through penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per by ULC S115, where systems protect penetrating items exposed to potential contact with adjacent materials:

.1 Penetrations located outside wall cavities.
.2 Penetrations located outside fire resistive shaft enclosures.
.3 Penetrations located in construction containing fire protection rated openings.
.4 Penetrating items larger than 100 mm diameter nominal pipe or 100 cm^2 in overall cross sectional area.

.4 Firestopping and Smokeseals Systems Exposed To View: Systems exposed to view, traffic, moisture, and physical damage; provide products that after curing do

not deteriorate when exposed to these conditions both during and after construction, and as follows:

.1 Provide moisture resistant through penetration firestop systems for piping penetrations for plumbing and wet pipe sprinkler systems.

.2 Provide firestopping and smokeseals systems capable of supporting floor loads involved either by installing floor plates or by other means for floor penetrations with annular spaces exceeding 100 mm in width and exposed to possible loading and traffic.

.3 Provide firestopping and smokeseals systems not requiring removal of insulation for penetrations involving insulated piping.

.4 Provide products with flame spread ratings of less than 25 and smoke developed ratings of less than 50 for firestopping and smokeseals and joint systems exposed to view.

.5 Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equalling or exceeding fire resistance rating of constructions in which joints are located.

2.3 FIRESTOPPING AND SMOKESEALS: GENERAL

.1 Compatibility: Provide firestopping and smokeseals systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping and smokeseals systems, under conditions of service and application, as demonstrated by firestopping and smokeseals system manufacturer based on testing and field experience, and as follows:

.1 Service penetration assemblies: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.

.2 Service penetration firestopping and smokeseals components: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.13, under the Label Service of ULC.

.3 Fire resistance rating of installed firestopping and smokeseals assembly not less than the fire resistance rating of surrounding floor and wall assembly.

.4 Firestopping and Smokeseals at openings intended for ease of re-entry such as cables: elastomeric seal; do not use cementitious or rigid seal at such locations.

.5 Firestopping and Smokeseals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations. Exemption to fire dampers.

.2 Accessories: Provide components for each firestopping and smokeseals systems that are needed to install fill materials. Use only components specified by firestopping and smokeseals system manufacturer and approved by the qualified testing and inspecting agency for firestopping and smokeseals systems indicated. Accessories include, but are not limited to, the following items:

.1 Permanent forming, damming and backing materials, including the following:

.1 Slag or rock wool fibre insulation.

.2 Sealants used in combination with other forming, damming or backing materials to prevent leakage of fill materials in liquid state.

.3 Fire-rated form board.

.4 Fillers for sealants.

.2 Temporary forming materials.

.3 Substrate primers.

.4 Collars.

.5 Steel sleeves.

.6 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.7 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.8 Metal fire stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m^2, minimum metal core thickness 0.912 mm.

.9 Steel Deck Moulded Flute Inserts: One piece moulded mineral fibre flute inserts, sized for steel deck profiles, for placement at top of fire rated wall assemblies:

.1 Acceptable material: Hilti CP777 Speed Plugs.

.10 Labels: Peel-and-stick labels printed with the following information:

.1 ATTENTION: FIRE RATED ASSEMBLY. DO NOT MODIFY

.2 Name of firestopping manufacturer

.3 Names of products used

.4 Hour Rating of Assembly

.5 Manufacturers standard detail number, or Engineered Judgement identifier; ULC or cULus Number

.6 Date of installation

.7 Name of installing Trade Contractor

.8 Contact telephone number for repair or replacement of firestopping materials.

2.4 FILL MATERIALS

.1 General:

.1 Provide firestopping and smokeseals systems containing the types of fill materials indicated in the Firestopping and Smokseals System Schedule below by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

.2 Firestopping and smoke seal systems shall be tested in accordance with ULC S115, and be comprised of asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases, and not to exceed opening sizes for which they are intended for the ratings as indicated on drawings.

.2 Cast-in-Place Firestopping and Smokeseals Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

.3 Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

.4 Firestopping and Smokeseals Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrating item.

.5 Cable Penetration Devices: premanufactured fire rated cable pathway systems, the following products are acceptable:

.1 EZ-Path Fire Rated Pathway, Specified Technologies Inc.

.2 CP 653 Speed Sleeve, Hilti.

.6 Intumescent Composite Sheets: Rigid panels consisting of aluminum foil faced elastomeric sheet bonded to galvanized steel sheet.

.7 Intumescent Putties: Non-hardening dielectric, water resistant putties containing no solvents, inorganic fibres, or silicone compounds.

.8 Intumescent Spray Foam: Expanding spray-in-place intumescent foam sealant.

.9 Intumescent Wrap Strips: Single component intumescent elastomeric sheets with aluminum foil on one side.

.10 Mortars: Pre-packaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

.11 Silicone Foams: Multi-component, silicone based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

.12 Silicone Sealants: Moisture curing, single component, silicone based, neutral curing elastomeric sealants of grade indicated below:

.1 Grade for Horizontal Surfaces: Pourable (self-levelling) formulation for openings in floors and other horizontal surfaces.

.2 Grade for Vertical Surfaces: non-sag formulation for openings in vertical and other surfaces.

2.5 ACCESSORIES

.1 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.2 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.3 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.4 Metal fire stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m^2, minimum metal core thickness 0.95 mm (20 ga.).

2.6 MIXING

.1 For those products requiring mixing before application, comply with firestopping and smokeseal system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to air vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed installation instructions, technical datasheets, details and specifications.

3.3 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.2 Ensure that substrates and surfaces are clean, dry and frost free.

.3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to air vapour barrier.

.5 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.4 INSTALLATION

.1 Apply fire stopping materials to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings:

- .1 Floor assemblies shall be fire separations with fire-resistance rating of not less than 2 hours.
- .2 Mezzanines shall have a fire-resistance rating not less than 1 hour.
- .3 Loadbearing walls, columns and arches shall have a fire-resistance rating not less than that required for the supported assembly.
- .4 Laboratory shall be separated from other parts of the building by a fire separation having a fire resistance rating not less than 1 hour.
- .5 Other fire ratings as indicated, refer to Building Code Review.

.2 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 At electrical boxes installed at gypsum board fire separations, Provide firestop back coating on box.

.5 Provide firestopping assemblies at joints and penetrations at acoustically rated separations (refer to Drawings) as required to achieve and maintain a minimum Sound Transmission Class (STC) of 60.

.6 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.7 Tool or trowel exposed surfaces to neat finish.

.8 Remove excess compound promptly as work progresses and upon completion.

3.5 SPECIAL REQUIREMENTS

.1 Coordinate Work with installation of expansion joint covers; install firestop at rated and unrated fire separations; at mechanical penthouse penetrations through floor slab, pack perimeters and holes full depth using mineral slag fibrous insulation firestop, and then install firestop membrane/sealant as required; firestop at deflection caps at both rated and unrated fire separations; back coat electrical boxes at fire rated partitions, including application of firestop mouldable putty pads and firestop coatings meeting Code; outlet boxes and fittings at fire separations shall ULC, cUL or cULus classified fire-resistant for fire rating matching rating of assembly.

.2 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:

.1 Designed for re-entry, removable at: electrical wiring and communications cable penetrations through partitions.

.1 Use Prefabricated Firestop Sleeves or prefabricated Cable Pathways.

3.6 SEQUENCING

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install mechanical and electrical services prior to firestopping. Firestopping shall not be installed at these locations until the electrical and mechanical installations have been reviewed and accepted by Consultant.

.3 Install floor fire stopping before interior partition erections.

.4 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

.5 Mechanical pipe insulation: certified fire stop system component.

.1 Ensure pipe insulation installation precedes fire stopping.

3.7 FIELD QUALITY CONTROL

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of fire stop and smoke seal work, in handling, installing, applying, protecting and cleaning of product, and submit Manufacturer's Field Reports to Consultant.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits with manufacturer to review Work before Work is closed-in to permit review.

3.8 PROJECT RECORD DOCUMENTATION

.1 At completion of fire stopping work, update Schedule and Shop Drawings submitted in accordance with the requirements of item 1.5.1.1 of this specification Section 07 84 00 - Fire Stopping.

.2 Ensure that each location that fire stopping has been applied is recorded along with all applicable fire stop information.

.3 Ensure that each application of fire stopping is documented with location and installation details provided.

.4 At the location of each application of fire stop, secure an identification label at both sides of penetration in a convenient, easy to read location, that documents the product used, manufacturer, installer, date of install, and the ULC assembly number involved.

.5 Submit updated Schedule and Shop Drawings in accordance with the requirements of Section 01 78 00 - Closeout Submittals, including accurate as-built information.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

3.10 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.11 SCHEDULE

.1 Meet or exceed the requirements of Ontario Building Code as amended and Ontario Fire Code as amended, and as follows:

.1 Install the following system at all rated stud walls where the stud connects to the underside of the decking above:

.1 System No. HW-D-0264, by HILTI; refer to datasheet attached following this Section.

.2 Fire stop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.

.2 Edge of floor slabs at curtain wall and precast concrete panels.

.3 Top of fire-resistance rated masonry and gypsum board partitions.

.4 Intersection of fire-resistance rated masonry and gypsum board partitions.

.5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.7 Openings and sleeves installed for future use through fire separations.

.8 Around mechanical and electrical assemblies penetrating fire separations.

.9 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

.10 Refer to System No. HW-D-0264 attached following this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 – Cast-In-Place Concrete.

.2 Section 04 20 00 – Unit Masonry.

.3 Section 06 40 00 – Architectural Woodwork.

.4 Section 07 46 46 – Mineral Fibre Cement Siding.

.5 Section 07 46 93 – Soffit Panels.

.6 Section 07 52 00 – Modified Bituminous Membrane Roofing.

.7 Section 07 62 00 – Sheet Metal Flashing and Trim.

.8 Section 08 11 13 – Metal Doors and Frames.

.9 Section 08 44 13 – Glazed Aluminum Framing Systems.

.10 Section 08 80 50 – Glazing.

.11 Section 08 91 19 – Louvres.

.12 Section 09 21 16 – Gypsum Board Assemblies.

.13 Section 09 30 13 – Tiling.

.14 Section 09 65 00 – Resilient Flooring.

.15 Division 23 – Mechanical.

1.2 REFERENCES

.1 ASTM International

.1 ASTM C834 -14, Standard Specification for Latex Sealants.

.2 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants.

.3 ASTM C1193-16, Standard Guide for Use of Joint Sealants.

.4 ASTM C1330-02(2013) Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

.5 ASTM C1521-13 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 COORDINATION

.1 Coordinate work of this specification section with interfacing and adjoining work for proper sequencing of each sealant installation and to provide moisture and water migration resistance, durability of the work, and protection of materials and finishes.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product technical datasheets and literature to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.4 Submit 2 copies of WHMIS MSDS.

.3 Samples:

.1 Submit 2 samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Comply with the requirements of Section 01 91 00 - Building Enclosure Performance Requirements.

1.2 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, protected from the elements, in dry location and in accordance with manufacturer's recommendations.

.2 Store and protect joint sealants from damage.

.3 Replace defective or damaged materials with new..

1.3 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

.2 Ventilate area of work by use of approved portable supply and exhaust fans.

1.5 WARRANTY

.1 Submit manufacturer’s warranty in accordance with the requirements of Section 01 78 00 - Closeout Submittals, made out in Owner’s name, for each Product specified.

.2 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2-years from date of Substantial Performance.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials: Use products meeting the requirements of this Section and suitable to the application to which the sealant is to be applied, selections restricted to the manufacturers listed below:

.1 BASF Master Builders

.2 Chemtron Manufacturing Ltd.

.3 Dow Corning Canada Inc.

.4 GE Silicones Limited.

.5 LymTal International.

.6 Pecora Corporation.

.7 PRC-DeSoto.

.8 Sika Chemical of Canada Ltd.

.9 Tremco Ltd.

.2 Use materials as received from manufacturer without additives or adulteration. Use one manufacturer's product for each Type specified. Where sealant applications cross or contact each other, ensure compatibility, maintenance of physical properties and performance characteristics, and continuity of seal.

2.2 GENERAL

.1 Use materials as received from manufacturer without additives or adulteration.

.2 Use one manufacturer's product for each Type specified.

.3 Where sealant applications cross or contact each other, ensure compatibility, maintenance of physical properties and performance characteristics, and continuity of seal.

.4 Joint sealants and caulking shall be commercial-grade.

2.3 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants require primers for suitable adhesion to substrate, use manufacturer's recommended primer.

2.4 SEALANT MATERIAL DESIGNATIONS

.1 Type S-1: Silicone Sealant; mould and mildew resistant.

.1 To ASTM C920; type S; grade NS; class 100/50; use NT, M, G, and A.

.2 Acceptable materials:

.1 790 Silicone, Dow Corning.

.2 Spectrum 1 Silicone, Tremco Inc.

.3 890NST, Pecora.

.2 Type S-2: Silicone Sealant; general construction and air-seal sealant.

.1 To ASTM C920: type S; grade NS; class 50; use NT, M, G, A, and O.

.2 Acceptable materials:

.1 864NST or 895NST, Pecora Corporation.

.2 Dow Corning 795, Dow Corning.

.3 Spectrum 2, Tremco Sealant & Waterproofing.

.3 Type S-3: Silicone Sealant; structural glazing.

.1 To ASTM C920: type S; grade NS; class 25; use NT, A, G, and O.

.2 Acceptable materials:

.1 995 Silicone, Dow Corning.

.2 Proglaze SSG, Tremco Inc.

.3 SSG4000, General Electric.

.4 895NST, Pecora.

.4 Type S-4: Acoustical Sealant; interior, non-hardening.

.1 To ASTM C834 Type P, Grade -18°C.

.2 Acceptable materials:

.1 Acoustical Sealant, Tremco.

.2 Metaseal, Chemtron.

.3 QuietZone acoustic sealant, Owens Corning.

.4 BA-98, Pecora.

.5 Type S-5: Multi-component polyurethane sealant; chemical curing, exterior wall sealant.

.1 To ASTM C920: type M; grade NS; class 50; use T, NT, M, A, and O.

.2 Acceptable materials:

.1 Dymeric, Tremco.

.2 Sikaflex 2c NS, Sika.

.3 Sonolastic NP 2, BASF Sonneborn.

.4 DynaTrol II, Pecora.

.6 Type S-6: One-component polyurethane sealant; non-sag, for general construction.

.1 To ASTM C920: type S; grade NS; class 25; use NT, M, A, and O.

.2 Acceptable materials:

.1 Polyurethane Sealant 540, 3M Company

.2 Dymonic or Dymonic FC, Tremco Inc

.3 Multiflex, Chemtron.

.4 Sonolastic NP 1, BASF Sonneborn.

.5 Sikaflex 1a, Sika.

.6 DynaTrol I-XL, Pecora.

.7 Type S-7: Horizontal joint sealant; two-component, self-levelling, commercial grade.

.1 To ASTM C920: type M; grade P; class 25; use T, M, O.

.8 Type S-8: One-part moisture curing, low modulus polyurethane sealant for sealing joints in level and slightly slope surfaces conforming to ASTM C920, type S, grade P, class 50, use T, M, A, O.

.1 Acceptable materials:

.1 Sonolastic SL 1, BASF Sonneborn.

.2 Vulkem 45 SSL, Tremco Inc.

.3 Urexpan NR-201b, Pecora.

.9 Type S-9: Control joint sealant: two-component, epoxy urethane, self-levelling, load bearing saw cut or preformed control joints.

.1 Acceptable materials:

.1 Loadflex, Sika.

.2 Dynapoxy EP-800, Pecora.

.3 MasterSeal CR 190, BASF Building Systems

.10 Type S-10: Wet area applications, kitchens, exterior door thresholds, showers, etc.: two-component, gun-grade, slump-resistant elastomeric polyurethane sealant, specially formulated for sealing joints in water-immersion conditions, and highly resistant to biodegradation by both aerobic and anaerobic bacteria; to ASTM C920, Type M, Grade NS, Class 25, use T, NT, M, G, A, O; certified to CAN/ULC S115; Canadian Food Inspection Agency acceptance.

.1 Acceptable Materials:

.1 Sikaflex 2c NS EZ Mix, by Sika Canada.

.2 Sikaflex 2c NS EZ Mix TG, by Sika Canada (traffic grade option).

.11 Type S-11: for exterior wall joints at porous substrates (e.g., masonry or concrete); One-part, silicone, shore A hardness 15 B 25, conforming to CGSB 19 GP 13M, classification C 1 40 B N and C 1 25 B N and ASTM C920 11, Type S, Grade NS, Class 25. Use NT, M, G, A and O: DC 756 by Dow Corning.

.12 Type S-12, to read as follows: “Type S-12 Foam sealant: open cell polyurethane foam impregnated with an acrylic-polymer-modified, water-based asphalt emulsion. Foam to have at least 90% open cell structure. Impregnation agent to have proven non-migratory characteristics. Uncompressed impregnation density shall be at least 9 lb/ft3 (144 kg/m3) but not exceed 10 lb/ft3 (160 kg/m3). Expanding foam laminations to be compressed 4-times to approximately 25% of fully expanded dimension: Emseal Joint Systems, Ltd. '25V'.

.13 Type S-13 Waterstop Sealant: for concrete penetrations: one component hydrophilic polyurethane-based extrudable swelling profile: Sika 'SikaSwell S'.

.14 Type S-14 Interior silicone sealant, paintable: Dow Corning 'Trade Mate' Silicone Sealant.

2.5 ACCESSORIES

.1 Preformed compressible and non-compressible back up materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are approved for applications indicated by sealant manufacturer based on site experience and laboratory testing.

.1 Rod Type Sealant Backings:

.1 ASTM C1330, Type C (closed cell material with a surface skin), Type O (open cell material) or Type B (bi cellular material with a surface skin).

.2 Use any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated.

.3 Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

.4 Non adhering to sealant, to maintain two-sided adhesion across joint.

.2 High Density Foam: Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by manufacturer.

.3 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

.2 Primer: Non-staining type as recommended by sealant manufacturer.

.3 Joint Cleaner: Non-corrosive solvent type recommended by sealant manufacturer for applicable substrate materials.

2.6 COLOURS

.1 Sealant colour: confirm sealant selections with Consultant prior to ordering materials. Colours shall be selected by Consultant from manufacture’s full range, and as follows:

.1 Sealants at masonry control joints to match mortar colour.

.2 Sealants at other locations to match colour of adjacent exposed material.

.3 Where colour match choice is unclear, Consultant will decide.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Unless explicitly prohibited by manufacturer, primer all joint bonding surfaces.

.2 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.3 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions

3.6 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.7 FIELD ADHESION TESTING

.1 Field test joint sealant adhesion to substrates in the presence of Consultant as follows:

.1 Extent of Testing: test completed and cured sealant joints as follows:

.1 Perform 10 tests for the first 300 m of joint length for each kind of sealant and joint substrate.

.2 Perform 1 test for each 300 m of joint thereafter or 1 test per each floor per elevation.

.2 Test Method: test joint sealants according to method A, Field-Applied Sealant Joint Hand Pull Tab, Appendix X1, ASTM C1193 or Method A, Tail Procedure, ASTM C1521.

.1 For joints with dissimilar substrates, verify adhesion to each substrate separately. Extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

.3 Inspect tested joints and report on finding for the following requirements:

.1 Joint cavities filled and free of voids.

.2 Sealant dimensions and configurations comply with sealant manufacturer's data sheet and printed installation requirements.

.3 No adhesive or cohesive failure noted during pull tests per ASTM criteria. Include data on pull distance used to test each kind of product and joint substrate.

.4 Record tests results in a field-adhesion test log. Include dates when sealants were installed, name of worker responsible in each instance, test dates, test locations, whether joints were primed or not, adhesion results and percent elongations, sealant fill, sealant configuration and dimensions.

.5 Repair sealant test locations by applying new sealants following approved preparation and application procedures.

.2 Evaluation of Field Adhesion Test results:

.1 Sealants passing ASTM pull-tests and compliant with specifications will be considered satisfactory.

.2 Remove sealants that fail adhesion tests or do not meet specifications, and apply in accordance with approved preparation and application requirements.

.3 Retest re-applied sealants until test results are satisfactory and sealant application is compliant.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.10 SCHEDULES

.1 General Provisions:

.1 Examine the Contract Drawings and determine entire extent of Work of this Section. Seal joints at terminations, perimeters, transitions and penetrations.

.2 Where no specified type of sealant is shown or specified, choose one of the sealants specified in this Section appropriate for its location and conditions as recommended by the sealant manufacturer in accordance with its warranty provisions and datasheet.

.3 Make sealant selections consistent with manufacturer's recommendations.

.2 Materials Schedule:

.1 Clean and prime bonding surfaces prior to applying sealants, and install sealants in accordance with the following requirements:

.1 Use mould & mildew resistant silicone sealant Type S-1 for non-moving joints in washrooms and kitchens. Do not use on floors.

.2 Use silicone general construction sealant Type S-2 for metal-to-metal joints where no other specific sealant type specified.

.3 Use structural glazing silicone Type S-3 for sealing glass, interior and exterior.

.4 Use acoustical sealant Type S-4 at acoustic-purposed joints, only where it will be fully concealed, and only where no constant or consistent air pressure difference will exist across the joint.

.5 Use multi component sealant type S-5 at masonry and concrete joints.

.6 Use one-component polyurethane general construction sealant Type S-6 at joints other than metal-to-metal where no other specific sealant type specified.

.7 Use multi component sealant Type S-7 for horizontal joint sealant of plaza, floors and decks, exterior areas only, subject to pedestrian and vehicular traffic.

.8 Use one-part sealant Type S-8 for horizontal joint sealant of plaza, floors and decks, exterior areas only, not subject to pedestrian and vehicular traffic.

.9 Use control joint sealant S-9 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.

.10 Use wet area sealant S-10 for horizontal and vertical joints, and perimeter joints, at showers, exterior door threshold plates, and other wet area applications. Use traffic grade (TG) at horizontal floor locations.

.11 Use sealant Types S-11, S-12, S-13, and S-14 at locations suitable to substrates, conditions, and purposes to be served as recommended by sealant manufacturer.

.3 Exterior Sealant Schedule:

.1 The following list is provided for general guidance and is not intended to exhaust all of the locations where sealant is required. Refer to item 3.10.1 General Provisions of this Section for general provisions.

.2 Exterior sealant work is part of the work of this section. Install exterior sealant to:

.1 General: seal open joints in surfaces exposed to view and as required to make the building weather-tight and airtight.

.2 Exterior joints between dissimilar materials.

.3 Perimeters of exterior openings where frames meet exterior façade of building.

.4 Movement and control joints in exterior surfaces of iin-place concrete and masonry.

.5 Exterior joints between masonry and in-place concrete.

.6 Exterior joints in horizontal wearing surfaces.

.7 Exterior intake and exhaust louvres. Provide space in sealant at bottom for drainage.

.8 Below door thresholds (2 beads).

.9 Penetrations through exterior building elements.

.10 Where indicated on drawings.

.3 Foam sealant installation: Compression when expanded in joint, shall be 25% or uncompressed thickness. Depth shall be in accordance with manufacturer's sizing table.

.4 Interior Sealant Schedule:

.1 The following list is provided for general guidance and is not intended to exhaust all of the locations where sealant is required. Refer to item 3.10.1 General Provisions of this Section for general provisions.

.2 Install interior sealant to:

.1 Movement and control joints on exposed in-place concrete walls.

.2 Interior control and expansion joints in floor and wall surfaces.

.3 Raked out joints at junctions of masonry with concrete walls and columns, and at intersection of masonry walls and partitions.

.4 Perimeters of exterior door, curtain wall and window frames.

.5 Joints at tops of non-load bearing masonry walls at the underside of metal deck or in-place concrete, except where fire sealant and smoke sealant required.

.6 Perimeter and perimeter joints of plumbing fixtures, with mildew resistant sealant.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 20 00 – Unit Masonry.

.2 Section 05 41 00 – Structural Metal Studs.

.3 Section 07 21 19 – Foam-In-Place Insulation.

.4 Section 07 46 46 – Mineral Fibre Cement Siding.

.5 Section 07 92 00 – Joint Sealants.

.6 Section 08 71 00 – Door Hardware.

.7 Section 08 80 50 – Glazing.

.8 Section 09 91 00 – Painting.

.9 Refer to Door Schedule & Details on Drawings.

1.2 REFERENCES

.1 American National Standards Organization (ANSI) / Steel Door Institute (SDI)

.1 ANSI/SDI A250.3-2007 (R2011), Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames.

.2 ANSI/SDI A250.8-2003 (R2008), Recommended Specifications for Standard Steel Doors and Frames.

.3 ANSI/SDI A250.10-1998 (R2011), Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A653/A653M-11, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A780/A780M-09, Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.

.3 ASTM A879/A879M-12, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface

.4 ASTM A924 / A924M-13, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.5 ASTM B29-03(2009), Standard Specification for Refined Lead.

.6 ASTM B749-03(2009), Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.

.7 ASTM C553-11, Specification for Mineral Fiber Blanket Insulation for Commercial and Industrial Applications

.8 ASTM C578-12b, Specification for Rigid, Cellular Polystyrene Thermal Insulation

.9 ASTM C591-12b, Specification for Un-Faced Pre-formed Rigid Cellular Polyisocyanurate Thermal Insulation

.10 ASTM C592-12, Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type)

.11 ASTM C1289-13e1, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

.12 ASTM D1622-08, Standard Test Method for Apparent Density of Rigid Cellular Plastics.

.13 ASTM D4726-09, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors.

.14 ASTM D6386-10, Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

.15 ASTM D7396-08, Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting.

.3 Canadian Standards Association (CSA International)

.1 CAN4-S106-M80, Standard Method for Fire Tests of Window and Glass Block Assemblies

.2 CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.3 CSA W47.1-09, Certification of companies for fusion welding of steel, Includes Update No. 3 (2011), Update No. 5 (2012).

.4 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)

.1 CSDMA, Guide Specification for Installation and Storage of Hollow Metal Doors and Frames, 2012.

.2 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2006.

.3 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 2009.

.5 National Fire Protection Association (NFPA)

.1 NFPA (Fire) 80, Standard for Fire Doors and Other Opening Protectives, 2013 Edition.

.2 NFPA (Fire) 252, Fire Tests of Door Assemblies, 2012 Edition.

.6 The Society for Protective Coatings (SSPC)

.1 SSPC-PS 12.01, One Coat Zinc-Rich Painting System.

.2 SSPC-PS Guide 12.00, Guide to Zinc-Rich Coating Systems.

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S104-10, Standard Method for Fire Tests of Door Assemblies.

.2 CAN/ULC S105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.

.3 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.4 CAN/ULC-S702-09-AM1, Standard for Thermal Insulation Mineral Fibre for Buildings, Includes Amendment 1 (January 2012).

.5 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer’s printed product literature, specifications and data sheets for each type of door and frame specified.

.2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures:

.1 Indicate general construction of each type of door and frame, configurations, material, material thickness, jointing methods, mortises, reinforcements, anchors, arrangement of hardware, fire ratings, finish and special features.

.2 Reference door and frame types to Door Schedule. Indicate door numbers where applicable.

1.4 QUALITY ASSURANCE

.1 Comply with the requirements of Section 01 91 00 - Building Enclosure Performance Requirements.

.2 Manufacturer/Fabricator: member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.

.3 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.

.4 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:

.1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.2 Fabricate all rated doors and frames to labelling authority standard.

.5 Manufacture door and frame assemblies to ANSI/SDI A250.8.

1.2 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements, and as follows:

.1 Receive and store materials as recommended by materials manufacturer.

.2 Adequately protect surfaces from damage during moving, handling and storage.

Part 2 Products

2.1 PERFORMANCE AND DESIGN CRITERIA

.1 Perform work in accordance with CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, except as otherwise specified herein.

.2 Design exterior frame assembly to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.

.3 Maximum deflection for exterior steel entrance doors under wind load of 1.2 kPa not to exceed 1/175th of span.

.4 Steel fire rated doors and frames: Label and list fire rated doors and frames by an organization accredited by the Standards Council of Canada in conformance with CAN/ULC S104 and CAN/ULC S105 for ratings specified or indicated. Fire labels must be factory applied by the manufacturer.

.5 Be responsible for securing approval from Authorities Having Jurisdiction for materials, fabrication and installation of fire rated oversized door and frame assemblies.

2.2 MATERIALS

.1 Steel:

.1 Doors and frames: coated steel sheets to ASTM A924/M924; coating designation to ASTM A653/A653M: Commercial Steel (CS), Type B, ZF180 galvannealed; stretcher leveled.

.2 Nominal Base Metal Thickness Requirements:

.1 Frames: refer to frame fabrication requirements specified in this section.

.2 Doors: refer to door fabrication requirements specified in this section.

.3 Hardware Reinforcement for Doors and Frames: Carbon steel, welded in place, prime painted, to the following minimum nominal thicknesses:

Hardware Reinforcement	Door (mm)	Frame (mm)
Pivot Hinge:	4.20	4.20
Mortise Hinge:	3.51	3.51
Mortise or Bored Lock or Deadbolt:	1.98	1.98
Flush or Surface Bolt Front:	1.98	1.98
Surface or Concealed Closer:	2.74	2.74
Strike Reinforcements:	1.98	1.98
Hold Open Arm:	1.98	1.98
Electronic Hardware Reinforcements:	1.98	1.98
Pull Plates and Bars:	1.30	1.30
Mortar Box:	--	0.84
Surface Exit Devices:	1.98	1.98
Door Surface Hardware Reinforcements:	1.30	1.30
Frame surface hardware reinforcements:	2.74	2.74

.3 Door Core Materials

.1 Honeycomb: Structural small cell 25 mm maximum. kraft paper honeycomb:

.1 Weight: 36.3 kg/ream minimum.

.2 Density: 16.5 kg/m^3 minimum.

.3 Sanded to required thickness.

.2 Polystyrene: Rigid extruded, closed cell insulation, fire retardant treated meeting the requirements of ULC S701, Type 4, minimum thermal resistance RSI 0.8/25 mm thickness.

.3 Temperature Rise Rated (TRR): core composition shall provide the fire-protection rating and limit the temperature rise on the unexposed side of door at 250°C for 30 or 60 minutes as determined by National Building Code of Canada, 2010. Core shall be tested as part of a complete door assembly in accordance with CAN/ULC S104 covering the Standard Method of Tests of Door Assemblies and shall be listed by a nationally recognized testing agency having a factory inspection service.

2.3 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polystyrene cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Interlocking Edge Seam Adhesive: fire-resistant, resin-reinforced polychloroprene, high-viscosity, sealant/adhesive.

2.4 ACCESSORIES

.1 Door silencers (bumpers): Black neoprene, to ANSI/BHMA A156.16 Type 6-180; three silencers on strike jambs of single door frames; two silencers on heads of double door frames; screw fastener applied. Stick on bumpers are not acceptable.

.2 Exterior top and bottom caps: steel.

.3 Interior top caps: rigid polyvinyl chloride extrusion, to ASTM D4726.

.4 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners, and fastened to frame sections with countersunk oval head sheet metal screws.

.5 Make provisions for glazing as indicated and provide necessary glazing stops.

.1 Provide removable glazing beads.

.2 Design exterior glazing stops to be tamper proof.

.6 Metallic paste filler: to manufacturer's standard.

.7 Fasteners: type 304 stainless steel screws with countersunk flat head.

.8 Labels for fire doors and door frame: brass plate, riveted to door and door frame.

.9 Sealant: Section 07 92 00 – Joint Sealants.

.10 Glazing: Section 08 80 50 – Glazing.

2.5 FABRICATION - GENERAL

.1 Welded construction: assemble units by welding in accordance with CSA W59 to produce a finished unit square, true, and free of distortion. Welding shall be continuous unless specified otherwise. Welding shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1.

.2 Permit access by an approved inspection and testing company for the purpose of inspecting at random, doors being fabricated for this project.

.3 Make provisions in doors and frames to suit requirements of trade or section providing electrically operated hardware or security devices. Provide removable plates or knock outs for electrical contacts. Provide junction boxes on security door frames as required for door strikes, mag locks and door contacts. Ensure frames arrive on site prepared for wiring.

.4 Fabricate galvanized steel channels to reinforce frames as required for size, and for fire protection rating requirements. Extend reinforcements from floor to structure above. Design top connection to accommodate structural deflection. Conceal reinforcements in frames.

2.6 FABRICATION - FRAMES (PRESSED STEEL DOOR AND SCREEN FRAMES)

.1 Supply frames to suit construction conditions and indicated dimensions.

.2 Fabricate frames of ZF120 wipe zinc coat steel unless otherwise indicated.

.3 Provide welded type pressed steel door frame and screen components in minimum thickness of 1.5mm (16 gauge).

.4 Assemble components with accurately cut joints. Mitre outside corner joints of frames. Continuously weld joints on inside of profile and grind welds, flush and sand to smooth uniform surface; tabbed and spot-welded connections are not acceptable.

.5 Provide recessed sheet steel panels, bases, and covers, where indicated, minimum 2 mm thick. At fire rated screens, construct panels, bases, and covers in accordance with fire test requirements. Weld panels, bases, and covers to perimeter framing in concealed manner where possible; where welds are exposed, provide continuous welds. Reinforce or laminate panels, bases, and covers as required to provide a flat uniform surface.

.6 Fill concealed void at exterior frames, between frame and rough opening, with mineral fibre insulation.

.7 On factory-assembles frame product, provide two removable steel jamb spreaders welded to the base of the jambs or mullions to maintain alignment during shipping and handling. Remove spreaders prior to anchoring frames to floor.

.8 Brace frame units to prevent distortion and protect finish during shipment.

.9 Install three bumpers in interior frames at single opening latch jambs, and two at double door frame heads.

.10 Provide mullions and rails of closed construction type. For fixed condition, attach members to frame with butt-welded joints. For removable condition, attach members with removable mullion anchors.

.11 Conceal fastenings unless otherwise indicated.

.12 Fasten removable stops by countersunk Phillips head screws at approximately 225mm (9") on centre symmetrically space on stop length.

.13 Form Door stops and glass stops integrally with frame and not added as a separate profile.

.14 Anchor frames to floor by 1.6 mm (0.063") thick adjustable base clips, welded to frame and Provide with 2 holes for floor anchorage.

.15 Provide minimum 3 mm anchors for connection to adjacent floor and wall construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite the strike jamb. On each jamb, install 2 anchors for openings up to and including 1525 mm (60") high and install 1 anchor for each additional height of 610 mm (24") of height or fraction thereof, except as indicated below. Frames placed in previously placed concrete, masonry or structural steel shall be Provided with anchors located not more than 150 mm (6") from top and bottom of each jamb, and intermediate anchors at 660 mm (26") on centre maximum. Fasteners for such anchors shall be provided by Section 06 20 00. Anchors for stainless steel frames shall be Type 316L stainless steel.

.16 Secure frames set in previously constructed concrete or masonry openings by countersunk expansion bolts at same centres as for adjustable Tee wall anchors. Reinforce frame at fastening location to prevent indentation of frame by fastening device. Provide steel sleeves between frame and wall.

.17 Protect strike and hinge reinforcements using guard boxes welded to frames at masonry construction. Provide guard boxes welded to frame at hinges, strikes, door alarm contacts, switches, and other hardware items recessed into frames.

.18 Reinforce head of frames wider than 1220mm (48") with steel angles or channels.

.19 Prepare door frames for security system contacts. Coordinate with Division 16.

.20 Provide welded-on drip at head of exterior door frames.

.21 Hardware reinforcements shall be minimum thicknesses specified, not including frame thickness. Provide reinforcement at hardware fastening points. Provide high frequency (angle type) reinforcement at hinges. Provide full height reinforcement of thicknesses at hinge side of frames with continuous hinges.

.22 Where indicated at interior screen frames, provide 38 mm square hollow steel railings between mullions, with concealed fastening to mullions. Design railings to comply with OBC load requirements for handrails. Provide hollow steel railings in accordance with Section 05 50 00.

2.7 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Where frames terminate at finished floor, supply floor plates for anchorage to slab. Check depth of extension of finished floor to structural slab and provide jamb extension anchorage as required. Provide 50 mm minimum adjustment

.3 Locate wall anchors immediately above or below each hinge reinforcement on the hinge jamb, and directly opposite on the strike jamb. Provide three anchors per jamb for frames up to 2300 mm. Add one anchor per jamb for each additional 760 mm or fraction thereof in frame height.

.4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.8 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Cut frame mitres accurately and weld on inside of frame profile. Fill frame corners, exposed surface depressions and butted joints with air drying paste filler. Sand to a smooth uniform finish. Touch up damaged galvanized finish with zinc rich primer.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

.7 Insulate exterior frame components with polyurethane insulation as indicated in Section 07 21 19.

2.9 DOOR FABRICATION: GENERAL

.1 Doors: swing type, flush, with provision for openings as indicated.

.2 Fabricate doors with longitudinal edges locked seamed with adhesive and spot-welded for larger doors. Seams: not visible, grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish. Bevel both stiles of single doors 1 in 16.

.3 Provide side panels where indicated or scheduled of same materials, gauge, thickness, construction and finish as door. Reinforce panels to prevent oil canning. Install transoms and panels with concealed fastenings and reinforce to accommodate hardware as required. Seal joint between panel airtight.

.4 Mortise, reinforce, drill, and tap doors to receive templated hardware, security, and electrical devices.

.5 Reinforce doors where required, for surface mounted hardware. Provide flush steel top and bottom caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.6 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.7 Cut-outs: Where openings are required, provide integrally formed cut-outs with steel framing, and closely fitted steel glass and grille stops, as required. Mitre corners of stops. Drill and countersink fasteners symmetrically at 150 mm o.c. Supply and install coated steel stops, with same coating type and thickness as doors. Screw stops in place.

.8 Supply and install steel vent grilles in doors where indicated.

.9 Fabricate doors with a clearance of 3 mm to the frame and 6 mm to completed floor finish or threshold, except at openings in non-fire rated separations where undercuts are indicated.

.10 Provide flush top and bottom steel edge on exterior doors and doors to stair shafts.

.11 Provide touch-up primer at areas where zinc coating has been removed or damaged during fabrication.

.12 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN/ULC S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.13 Manufacturer's nameplates on doors are not permitted.

2.10 FABRICATION: EXTERIOR DOORS

.1 Face sheets: Minimum 1.6 mm base steel sheet thickness.

.2 Stiffened, insulated and sound deadened with polystyrene core laminated under pressure to each face sheet.

.3 Longitudinal edges mechanically interlocked, adhesive assisted with edge seams continuous welded, filled, and sanded flush with no visible seam.

2.11 FABRICATION: INTERIOR DOORS

.1 Face sheets: Minimum 1.2 mm base steel sheet thickness.

.2 Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.

.3 Longitudinal edges mechanically interlocked, adhesive assisted with edge seams continuous welded, sanded flush with no visible seam.

2.12 FABRICATION: EXTERIOR AND INTERIOR FIRE RATED DOORS

.1 Face sheets: Minimum 1.6 mm base steel sheet thickness.

.2 Temperature Rise Rated (TRR) core laminated under pressure to each face sheet.

.3 Longitudinal edges mechanically interlocked, adhesive assisted with edge seams continuous welded, sanded flush with no visible seam.

.4 Equip pairs of fire labelled doors with minimum 2.7 mm (0.105") steel surface mounted flat bar astragal, shipped loose for application on site.

2.13 LAMINATED CORE CONSTRUCTION

.1 Form face sheets for exterior doors from 1.6 mm sheet steel with polystyrene core laminated under pressure to face sheets.

.2 Form face sheets for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.14 EXTERIOR FRAMES

.1 Insulate exterior frame components with polyurethane foamed-in-place insulation, as indicated in Section 07 21 19.

.2 Insulate fire rated exterior frame components with fire stop fill material in accordance with requirements of authority having jurisdiction.

2.15 PRIMER

.1 Touch-up primer: Commercial rust inhibitive primer, shop prime coat doors and frames before delivery; grey or red coloured primer; in accordance with Section 09 91 00 – Painting. Clear primer not acceptable; provide primer for field touch-up.

2.16 PAINT

.1 Exterior Doors: refer to Drawings.

.2 Field paint steel doors and frames in accordance with Section 09 91 00 - Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

.3 Colour: as selected by Consultant from manufacturer’s full colour range; submit colour cards for initial selection prior to ordering materials.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work means acceptance of existing conditions

3.3 INSTALLATION GENERAL

.1 Install fire rated doors and frames in accordance with requirements of NFPA 80.

.2 Install doors and frames to, CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.

3.4 FRAME AND SCREEN INSTALLATION

.1 Set frames and screens plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Install hollow metal window frames and partition screens at interior locations as indicated.

.6 Install door silencers.

.7 Caulk perimeter of frames between frame and adjacent material.

.8 Maintain continuity of air barrier and vapour retarder.

3.5 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 05 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.

.1 Hinge side: 1.0 mm.

.2 Latchside and head: 1.5 mm.

.3 Finished floor, top of carpet, non-combustible sill, or thresholds: 6 mm.

.3 Adjust operable parts for correct function.

3.6 FINISH REPAIRS

.1 Touch-up areas where galvanized coating has been removed or damaged with primer.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.7 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 – Glazing.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 – Gypsum Board Assemblies.

.2 Section 09 30 13 – Tiling.

.3 Section 09 91 00 – Painting.

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit 1 of each type of hand entry access door.
- .4 Submit one 300 x 300 mm corner sample of each type of body entry door.

1.2 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of finishes for incorporation into manual.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.4 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.5 Store and protect access doors from damage and nicks, scratches, and blemishes.

Part 2 Products

2.1 CONCEALED GLASS FIBER REINFORCED GYPSUM DOORS AND ACCESS PANELS FOR CEILINGS AND WALLS (GFRG)

.1 Basis-of-design materials and colours:

- .1 Coordinate with Section 09 05 00 - Product and Finish Key.

.2 Refer to legends and schedules on Drawings.

.2 Architectural, flush mounting access panels for gypsum board and/or masonry installation, thickness and fire rating to match assembly, manufacturer's standard sizes selected to suit project conditions and access requirements.

.3 Fire resistance rated and regular as required to match rating of adjacent assembly.

.4 Material: GFRG.

.5 Hinge: hidden continuous piano hinge.

.6 Lock / Latch: hex head cam lock.

.7 Finish: Contractor shall prime and finish paint on site to match adjacent surface.

.8 Gaskets: neoprene.

.9 Sizes: Except as indicated otherwise, to be minimum sizes as follows:

.1 For body entry: 610 x 610 mm.

.2 For hand entry: 305 x 305 mm.

.10 Construction:

.1 Wall access doors:

.1 Material: GFRG,.

.2 Style: seamless / concealed.

.3 Square corners, concealed hinges, hex head cam lock, able to open 180°.

.11 Basis-of-Design:

.1 Acudor Recessed Access Panels, or approved similar with same or better physical properties, appearance and functionality.

2.2 METAL ACCESS DOORS AND PANELS FOR CEILINGS AND WALLS

.1 Architectural, flush mounting access panels for gypsum board and/or masonry installation, thickness and fire rating to match wall assembly, manufacturer's standard sizes selected to suit project conditions and access requirements, complete with extruded aluminum frame, concealed hinge and a removable door panel, air tight gasket and hex head cam lock mechanism.

.2 Fire resistance rated and regular as required to match rating of adjacent assembly.

.3 Material: 16-gauge cold rolled steel.

.4 Hinge: hidden continuous piano hinge.

.5 Lock / Latch: hex head cam lock.

.6 Primer: factory-applied white powder coat. Contractor to finish paint on site to colour to match adjacent surface.

.7 Gaskets: neoprene.

.8 Sizes: Except as indicated otherwise, to be minimum sizes as follows:

.1 For body entry: 610 x 610 mm.

.2 For hand entry: 305 x 305 mm.

.9 Construction:

.1 Wall access doors:

.1 Material: Prime coated steel.

.2 Rounded safety corners, concealed hinges, screwdriver latch, and anchor straps, able to open 180°.

.10 Acceptable Manufacturers

.1 Acudoor Products Inc.

.2 Bauco Products Incorporated.

.3 Best Access Doors.

Part 3 Execution

3.1 INSTALLATION

.1 Installation: Install GFRG and/or metal access panels as directed by Consultant, and in accordance with manufacturer's printed installation instructions, installation details and illustrations, and technical datasheets.

3.2 LOCATIONS

.1 Locations: ensure that equipment is within view and accessible for operating, inspecting, adjusting, servicing without using special tools.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.5 SCHEDULE

.1 Consult Drawings and locate where access through wall is required and/or shown. Exact locations determined by Consultant.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications.

.2 Section 07 21 19 – Foam-In-Place Insulation

.3 Section 07 26 00 – Vapour Retarders.

.4 Section 07 62 00 – Metal Flashing and Trim.

.5 Section 07 92 00 – Joint Sealants.

.6 Section 08 50 23 – Polyvinylchloride Windows.

.7 Section 08 71 00 – Door Hardware.

.8 Section 08 80 50 – Glazing.

.9 Section 08 91 19 – Louvres.

.10 Refer to Drawings.

1.2 REFERENCES

.1 American Architectural Manufacturers Association (AAMA)

.1 AAMA CW-10-15, Care and Handling of Architectural Aluminum from Shop to Site.

.2 AAMA CWG-1-89, Installation of Aluminum Curtain Walls.

.3 AAMA 503-14, Voluntary Specification for Field Testing of Metal Storefronts, Curtain Wall and Sloped Glazing Systems.

.4 AAMA 609 & 610-15, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

.5 AAMA 701/702-11, Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

.2 ASTM International (ASTM)

.1 ASTM A123/A123M-15, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.3 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.4 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.5 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.6 ASTM B429/B429M-10e1, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

.7 ASTM C864 - 05(2011), Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

.8 ASTM E783 - 02(2010), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

.9 ASTM E1105-00(2008), Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.10 ASTM E2112 - 07(2016), Standard Practice for Installation of Exterior Windows, Doors and Skylights.

.3 CSA Group (CSA)

.1 CAN/CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

.2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA W59.2-M1991(R2003), Welded Aluminum Construction.

.4 Society for Protective Coatings (SSPC)

.1 Surface Preparation Guidelines:

.1 SSPC-SP COM Surface Preparation Commentary for Steel and Concrete Substrates.

.2 SSPC-PS Guide 12.00, Guide to Zinc-Rich Coating Systems.

.2 SSPC - Paint 20 Zinc Rich Coating.

.3 SSPC - Paint 25 Alkyd, Zinc Oxide Linseed Oil and Primer for Use Over Hand Cleaned Steel Type 1 and Type 2.

1.3 DESIGN RESPONSIBILITY

.1 Drawings and details are diagrammatic and are intended to show design concept, configuration, components and arrangements; they are not intended to identify nor solve completely the problems of thermal and structural movements, air pressure equalization, air and vapour barriers, assembly framing, fixings and anchorages, moisture disposal, water penetration, orientation of walls, shading factors, size and shape of glazing, location of convectors, location of blinds, and problems at the glass line associated with glazing installation, movements, pressure fracture or thermal shock and weather seal.

.2 The design, engineering, procurement, fabrication and erection of the curtain wall assemblies, as required to meet these performance specifications shall be the complete responsibility of the Contractor.

1.4 PERFORMANCE CRITERIA

.1 Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:

.1 Thermal stresses transferring to building structure.

.2 Glass breakage.

.3 Loosening or weakening of fasteners, attachments, and other components.

.2 Meet the requirements of the Ontario Building Code 2012 plus amendments and the National Energy Code of Canada for Buildings (NECB), current editions.

.3 Minimum Erection Tolerances:

.1 Design and install the curtain wall to accommodate tolerances of related work not included in this section. This requirement is in addition to building structure movements and deflections.

.2 Fabricate components to provide a plumb, square, level and true installation, and to accommodate allowable tolerances for work of other sections upon which work of this section depends.

.3 Erection tolerances for frame assemblies relate to the structural grid of the building, and apply to each individual assembly as follows:

.1 Vertical position: +3 mm;

.2 Horizontal position: +3 mm;

.3 Deviation from plumb: 3 mm maximum each plane;

.4 Racking of face: 6 mm maximum;

.5 Racking in elevation: Nil;

.6 Offset from true alignment between two identical members abutting end to end in line: 0.8 mm;

.7 Tolerances shall not be accumulative;

.8 Erection tolerances for operable elements: consistent with smooth operation and weatherproof performance.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: Convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with Contractor, Consultant, installer, and manufacturer’s representative in accordance with Section 01 31 19 – Project Meetings to:

.1 Verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements;

.2 Review location and alignment of vertical and horizontal elements as they relate to the aesthetic criteria indicated on the Drawings, and the technical requirements indicated on the shop drawings.

.2 Coordination: Coordinate installation of system with work specified in other Sections to ensure proper placement and installation of vapour barrier, insulation and flashing in order that air, vapour and thermal barrier of building is intact and moisture will be diverted to the exterior, and as follows:

.1 Coordinate installation of sealants so that ambient and surface temperatures are greater than 5°C from time of application until sealants have cured.

.2 Coordinate connection of curtain wall system structural connections at floor slabs to vertical members.

1.6 ACTION AND INFORMATION SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and technical data sheet.

.2 Submit product data indicating construction details, material descriptions, dimensions of individual components and profiles, finishes, anchorage and fasteners, glass and infill, internal drainage details.

.2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit shop drawings, signed and sealed by manufacturer’s engineer, detailing fabrication and assembly of glazed aluminum curtain wall systems clearly indicating all construction details including; but not limited to, the following:

.1 Fully dimensioned layouts for positioning of secondary support members and anchorage of tie-back devices to structures.

.2 Large scale details of members and materials, of brackets and anchorage devices and of connection and jointing details.

.3 Fully dimensioned layouts for positioning of brackets and anchorage devices to structures.

.4 Dimensions, gauges, thicknesses.

.5 Type, size and spacing of fastening devices.

.6 Glazing details.

.7 Air/vapour barrier details, acoustic control details, aluminum alloy and temper designations, metal finishing specifications and other pertinent data and information.

.8 Internal drainage.

.9 Show details of connecting work of this section with work of adjacent sections.

.3 Submit samples in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit samples of materials for Consultant's verification of specified finishes including; but not limited to, the following:

.1 300 mm x 450 mm for sheets, plates and glass;

.2 300 mm long for extrusions and formed or rolled shapes;

.3 300 mm long for tapes and gaskets;

.4 150 mm long for sealants;

.5 Samples shall fully represent physical and chemical properties, finish, and colours of materials to be supplied.

.2 Submit a sample of each finish hardware item that is to be supplied under this section.

.3 Submit two samples 610 x 610 mm in size illustrating window frame section, insulation, vapour barrier, glass, spandrel panels, vents and sealant.

.4 Closeout Submittals: Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals and as follows:

.1 Submit data for cleaning of aluminum finishes and maintenance of structural silicone glazing system and operational hardware;

.2 Instruction for replacement of glass units (insulating and structural glass).

1.7 QUALITY ASSURANCE

.1 Comply with the requirements of Section 01 91 00 - Building Enclosure Performance Requirements.

.2 Sole Source for Aluminum Products:

.1 Use same manufacturer for exterior aluminum framing and entrances.

.2 Use same manufacturer for interior aluminum screens and doors.

.3 Qualifications: The firm producing and executing the Work of this Section shall have a minimum of 10 years' successful experience in the fabrication and erection of systems of similar sizes, shapes and finishes to the units required for this project and shall have ample facilities to produce, furnish and supply the units as required for installation without delay to the Work.

1.2 MOCK-UP

.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

.2 Mock-up: Construct full size 3 x 3 m (10 x 10 ft) mock-up of vertical glazed aluminum curtain wall using proposed procedures, materials and quality of work where directed by Consultant and in accordance with Section 01 45 00 - Quality Control.

.3 Include framing components, glass, and insulated infill panel.

.4 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

.5 Purpose: To judge quality of work and material installation.

.6 Allow Consultant 24 hour’s minimum prior to inspection of mock-up.

.7 Do not proceed with work prior to receipt of written acceptance of mock-up by Consultant.

.8 When accepted, mock-up will demonstrate the minimum standard of quality required for work of this Section.

.9 Approved mock-up will remain part of finished work.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Comply with AAMA CW-10 for care and handling of all aluminum Products through the entire manufacturing, finishing, fabrication, delivery and installation phases.

.2 Protect metal and metal finishes to prevent damage during fabrication, storage, shipping, handling and installation.

.3 Protect insulating glass units during shipment. Repair or replace damaged components or units as required to meet Contract requirements and replace any gas leakage during shipping to specified concentrations.

.4 Deliver, handle and store units by methods approved by manufacturer. Store units at site on wood platforms raised above grade or in enclosures protected from elements and corrosive materials. Stack units vertically in manner to prevent racking. Do not remove from crates or other protective covering until ready for installation.

1.4 SITE CONDITIONS

.1 Site Measurements: Verify dimensions of other construction by site measurements before fabrication and indicate measurements on shop drawings where aluminum curtain wall systems are indicated to fit to other construction.

.2 Established Dimensions: Establish dimensions and proceed with fabricating aluminum curtain wall without site measurements where site measurements cannot be made without delaying the Work, coordinated with other construction to ensure that actual dimensions correspond to established dimensions.

.3 Ambient Conditions: Confirm installation requirements for ambient and surface temperatures of sealants with manufacturer and apply sealants when temperatures are greater than manufacturer’s stated minimum from time of application until sealants have cured.

1.5 WARRANTY

.1 Provide manufacturer's written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

.1 Framing, panels and glazing: failure of performance requirements specified in Contract Documents; 2 years.

.2 Sealants, caulking: failure to maintain seal; 2 years.

.3 Structural silicone glazing; 20 years.

.4 Aluminum brake shapes: oil-canning and delamination; 2 years.

.2 Provide Warranty for aluminum windows to include in maintenance manuals as specified in Section 01 78 00 – Operations and Maintenance Data Manuals.

Part 2 Products

2.1 DESCRIPTION OF BASIS-OF-DESIGN SYSTEMS

.1 Refer to Section 01 62 00 - Product Options; where specific products are named, supply that system or similar with same or better physical properties and performance characteristics that suits the design concept of the project and meets or exceeds the requirements of this specification Section and Section 09 05 00 - Product and Finish Key.

.2 Aluminium finishes:

.1 Refer to Section 09 05 00 - Product and Finish Key.

.2 Aluminium finishes shall be factory applied per the requirements of this section.

.3 Minimum requirements:

.1 Linetec Duranar (70% Kynar resin content).

.2 Consultant shall select or confirm colours from Linetec “Standard Colors” during shop drawing review.

.3 Contractor shall allow a minimum of 2 colours for exterior aluminium frames and 2 colours for interior aluminium frames.

.3 Aluminium Interior Screens and Swing Doors:

.1 Basis-of-Design:

.1 Refer to Section 09 05 00 - Product and Finish Key for requirements.

.2 Aluminum Framing: PC350 Elite Glazing System, or similar, with same or better physical properties and performance criteria.

.3 Aluminum Swing Doors without electrical devices:

.1 PC350 Series 200-P2, or similar, with same or better physical properties and performance criteria.

.4 Aluminum Swing Doors with electrical devices:

.1 PC350 Series 200-P5, or similar, with same or better physical properties and performance criteria.

.5 Finishes as selected by Consultant from manufacturer’s full range.

.6 Basis-of-Design System:

.1 PC350.

2.2 MATERIALS

.1 Aluminum materials:

.1 Extruded aluminum: to CSA HA-Series 6063 alloy, T5 or T6 temper, free from perceptible distortions, waves, twists, buckling or other deficiencies of appearance or performance.

.2 Sheet, unexposed: utility sheet to CSA HA-Series 6063 alloy, T5 or T6 temper.

.3 Sheet, exposed: to ASTM B209/B209M, anodizing quality to AA-1100 series.

.4 Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

.5 Sheet and plate: to ASTM B209/B209M, anodizing quality, alloy and temper suitable for purpose and finish required, special hardness for flat panel application, re-squared saw cut edges, free from perceptible distortions, waves, twists, buckling or other deficiencies in appearance or performance.

.1 Panels, copings, soffits, sills, trims, closures and other such components shall be minimum 3 mm thick; 1.5 mm thickness may be used for flashings. Finish to match exterior curtain wall finish.

.6 Extruded bars, rods, profiles, and tubes: In accordance with ASTM B221/B221M, and AA-6063-T5 or T6 temper, anodizing quality.

.7 Aluminum extruded structural pipe and tubes: In accordance with ASTM B429, and AA6063-T6 temper, anodizing quality.

.8 Structural Profiles: In accordance with ASTM B308/B308M, anodizing quality.

.9 Aluminum welding: to CSA W59.2.

.2 Steel: to CSA G40.20/G40.21, 300W hot dipped galvanized after fabrication to ASTM A653/A653M, minimum coating of 600 g/m^2 shapes to suit mullion sections.

.3 Galvanizing, unless otherwise specified: hot dipped galvanizing, with minimum zinc coating of 600 g/m^2 to ASTM A653/A653M.

.4 Stainless steel: to ASTM A167, Type 304 or 316; of one type throughout.

.5 Anchors: 3-way adjustable hot-dip galvanized cast iron.

.6 Fasteners: to ASTM A167, stainless steel, type 304 as recommended by curtain wall manufacturer selected to prevent galvanic action with the components fastened, of suitable size to withstand imposed loads.

.7 Anti-rotation spacers: manufacturer’s extruded aluminum spacers with integral gaskets as required at frame transitions and termination points, including at dual-glazed framing to single-pane spandrel panel transitions.

.8 Grout fill for anchor pockets: non-shrink Masterflow 713 Plus, by BASF, or SikaGrout 212, by Sika Canada.

.9 Primers and Adhesives: as recommended by curtain wall manufacturer.

.10 Thermal barrier consists of 1” (25 mm) separation between the interior and exterior metal members in a typical condition, while maintaining a continuous watertight seal. Thermal barrier assembly shall be tested to the thermal cycling requirements of ASTM E2692 and show no sign of degradation following the test.

.1 Thermal separators (thermal break): Thermal separator shall be extruded of a silicone compatible elastomer that provides for silicone adhesion, of size to conform to the extruded aluminum members or other locations where required, and having a minimum tensile strength of 14 MPa (2000 psi) and Durometer A Hardness of 60, +/- 5.

.11 Concealed flashing: manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

.12 Transition membranes: full-length mechanically anchored, extruded silicone rubber transition membrane to perimeter of frame profile to provide continuous air/vapour retarder to adjacent wall construction, compatible with adjacent materials and systems.

.1 Acceptable Materials:

.1 Dow Corning Silicone Transition Strip.

.2 GE UltraSpan UST Silicone Transition.

.3 Pecora XL-Span 100% Silicone Extruded Transition Membrane.

.13 Gaskets: glazing gaskets shall be silicone-compatible EPDM to ASTM C864, with dimensional tolerances and durometer hardness and of suitable size and shape to meet the requirements of the specifications and their specific application, designed to remain flexible at low temperatures, and provides for silicone adhesion; heat-resistant where required due to proximity of heating units.

.14 Isolation coating: alkali resistant bituminous paint.

.15 Primer for ferrous metals: CISC/CPMA 2-75.

.16 Zinc chromate primer, by PPG Industries, Inc. or similar.

.17 Touch up primer for galvanized steel: organic zinc rich primer, by Sherwin Williams Company of Canada Ltd. or similar.

.18 Insulated Spandrel Panels

.1 Spandrel Glass: to Section 08 80 50.

.2 Back pan: Galvanized steel in accordance with ASTM A653, 0.91 mm base metal thickness, formed into a pan shape to fit into glazing throat with back of pan flush with inside face of back section.

.3 Insulation for back pans: CurtainRock 80 by Roxul Inc., or Fibrex Safing, held in place with manufacturer’s standard fixing system to back face of back pan.

.19 Insulation for miscellaneous voids and cavities: CurtainRock 80 by Roxul Inc., or Fibrex Safing, friction fit, or held in place by miscellaneous metal angle or sheet metal flashing, as required.

.20 Flexible flashing, flexible air/vapour retarder:

.1 Flashing as recommended by the curtain wall manufacturer, compatible with adjacent materials and systems.

.2 Adhesive, tapes, primers and sealant: as recommended by the flexible flashing manufacturer.

.21 Sheet metal air/vapour barrier to be bonded to glazing frame and extended behind mounting frame. Seal to maintain continuity of seal. Install flexible flashing with continuous metal retaining strip to lap to interior wall assembly.

.1 Sheet metal for metal air/vapour barriers and air seals: ASTM A653 / A853M, minimum 1 mm sheet steel, galvanized, stretcher-levelled, minimum coating weight 380 g/m^2.

.22 Sealants, including primer, joint filler: as specified in section 07 92 10, augmented as follows:

.1 Sealants used in structural joints shall have adequate strength to retain insulating units to the metal framing or each other under design conditions.

.2 Sealants shall be from the same manufacturer for all work of this Section.

.3 Materials used in the work shall be resistant to rodents, vermin, mildew, fungus and algae.

.23 Glass and Glazing: to Section 08 80 50 - Glazing

.24 Fire Safety Materials: to Section 07 84 00 - Firestopping.

.25 Flashing: matching aluminum flashing as recommended by manufacturer, and as follows:

.1 Flashing: roll formed aluminum, 0.019" thick, mill finish.

.2 Aluminum sheet to conform to Federal Specification QQ-A-359, Alloy 3003.

2.3 ALUMINUM SWING ENTRANCES

.1 Aluminum Extrusions: Alloy and temper recommended by sliding aluminum-framed glass door manufacturer for strength, corrosion resistance, and application of required finish and not less than 2.3 mm wall thickness at any location for the main frame and sash members.

.2 Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with sliding aluminum-framed glass door members, trim hardware, anchors, and other components.

.3 Anchors, Clips, and Accessories: Aluminum or nonmagnetic stainless steel; provide sufficient strength to withstand design pressure indicated.

.4 Reinforcing Members: Aluminum or nonmagnetic stainless steel; provide sufficient strength to withstand design pressure indicated.

.5 Weather Seals: Provide weather stripping with integral barrier fin or fins of semi rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

.6 Door stile and rail face dimensions of entrances shall be as indicated. Provide manufacturer’s heavy-duty commercial door adaptors.

.7 Major portions of the door members to be 3.2 mm nominal in thickness and glazing molding to be 1.3 mm thick.

.8 Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.

.9 Provide adjustable glass jacks to help center the glass in the door opening.

2.4 FABRICATION – GENERAL

.1 Do not start fabrication until samples, shop and erection drawings have been reviewed.

.2 Insofar as practical, execute fitting and assembly in the shop with the various parts or assemblies ready for erection at the building site.

.3 Where possible, take field measurements and levels required to verify or supplement those shown on the drawings for the proper layout and installation of the work. Coordinate dimensional tolerances in adjacent building elements and confirm prior to the commencement of the Work.

.4 Weld aluminum, where required, with inert metal arc equipment. Welders to qualify according to CSA W47.2. Make exposed welds continuous and flush with adjacent surface. Do not mar surface finishes with welds in back of exposed aluminum. Do not deform the exposed metal and finish way by welding.

.5 Weld steel, where required, to CSA W59. Welded joints to be of adequate strength and durability with jointing tight and flush. Welders to be fully approved by the Canadian Welding Bureau and to comply with CSA W47.1. Where it is necessary to weld components already galvanized, remove galvanizing for 50 mm around weld.

.6 If curtain wall framing extends up to top of roof parapets, the headrail and glazing cap shall be reinforced to withstand force from window cleaner's suspension chair ropes, which will extend over the top of the parapet and down the face of the building.

.7 Make provisions in doors and frames to suit requirements of electrically operated hardware and security devices, as applicable, provided under other trades or sections. Blank, drill, reinforce and tap to receive hardware, security and electrical devices. Provide removable plates or knockouts for electrical contacts. Provide fish wires as required.

.8 Equip perimeter framing with factory installed air and vapour barrier material as required for sealing to building air and vapour barrier, and as follows:

.1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.

.2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

2.5 FABRICATION – FRAMING MEMBERS

.1 Fabricate members to the profiles shown on the drawings. Wall thickness of extrusions to be as required to meet the design requirements. Frames that are to receive insulating glass units shall have a continuous thermal break.

.2 Accurately machine file and fit, and rigidly frame together joints, corners and mitres. Match components carefully to produce perfect continuity of line and design. Make exterior joints watertight and interior joints airtight in accordance with specified allowances. Metal in contact to have hairline joints. Locations of exposed joints to be subject to the approval of the Consultant.

.3 Sill Trim: Provide continuous extruded "U" trim to inside of bottom rail at each level with provision for receiving steel base and convector covers, as detailed

.4 Reinforce frames and assemblies by concealed means as necessary to meet the specified design requirements and as shown. Reinforcing to be hot-rolled mild steel and be securely anchored to horizontal and vertical members by approved positive mechanical means.

.5 Seal hairline joints at junctions of frame members. Gun-inject sealant from inside ensuring a continuous seal of the joint. Ensure that bead in the glazing space does not impair seating of glazing materials. Remove excess sealant that is forced onto face of frame assembly.

.6 Location of joints and pressure equalizing drain vents to be subject to consultant's acceptance.

.7 Provide sheet continuous air/vapour barrier between framing and building structure. Overlap corner joints. Apply barriers and retain with continuous aluminum or galvanized steel plates or bars and non-corrosive mechanical fasteners. Where indicated, fill void between frame and other building components solid with foamed in place polyurethane foam insulation.

.8 Develop drainage holes with moisture path to exterior.

.9 Prepare components to receive anchor devices. Fabricate anchorage items.

.10 Arrange fasteners, attachments, and jointing to ensure concealment from view.

.11 Cope, notch and drill to provide minimum tolerance throughout system and to fit with hairline joints.

.12 Conceal interconnecting members and fastenings in completed assembly. Provide pressure-equalizing holes in members and condensation drains.

.13 Framing members and associated sealing shall combine to form airtight vapour barrier for entire interior skin of curtain wall system. Cooperate and coordinate with other sections to ensure continuous thermal and air barrier seal at interfaces with adjacent materials.

.14 Provide for vertical expansions and construction joints as necessary and install air cut-offs in continuous vertical members to prevent stack effect of enclosed air columns.

.15 Jointing and intersections of metals shall be accurately cut, fitted to a tolerance of 0.8 mm, in true planes with adequate concealed beads where required.

.16 Fabricate expansions joints between mullion sections with formed extruded aluminum internal sleeve sections, secure to permit joint function and maintain true alignment of sections.

.17 Fabricate sections to accommodate and interface with work of other trades by means of rabbets, interlocks, miscellaneous angles, trim and filler sections as required.

.18 Fabricate mullions not less than one storey height with fully fashioned expansion joints adequate for expansion and contraction required. Avoid chimney effect inside mullions by stopping voids at each floor level with packing consisting of rigid insulation.

.19 Brake form parapet caps and sills out of 3 mm thick aluminum sheet.

.20 Reinforce mullions with structural steel sections where required with adequate anchorage to structure.

.21 Provide internal reinforcement in horizontal window mullions to satisfy wind loads and to maintain rigidity.

.22 Perform fitting and assembly of component parts in shop insofar as practicable. Work that cannot be permanently shop assembled shall be fitted, assembled, marked and disassembled to assure proper fitting in field. Identify shop assembled components on shop drawings for location and erection at site.

.23 Isolate aluminum in contact with other metals, masonry, concrete, plaster or mortar to prevent corrosion.

.24 Verify wall openings and adjoining air and vapour seal materials are ready to receive work of this section.

.25 Beginning installation means acceptance of site conditions.

.26 Provide airtight vapour seals in curtain wall framing.

2.6 FABRICATION – SPANDREL PANELS

.1 Refer to Drawings for size, type and location of glass spandrel panels.

.2 Spandrels to have insulated backup panels, complete with 75 mm thick insulation consisting of two layers. Secure insulation to metal liner with adhesive and "spindle" clips with black retainer discs, minimum two per board.

.3 First layer of insulation to be 50 mm thick impaled on clips and secured with retainer discs. Second layer to be black-faced, secured to first with adhesive, uniformly spread over opposing faces. Align panels symmetrically with joints in line and tight together. Cut off ends of spindles just above discs. It is imperative that joints are tight so that edges do not show, if misaligned, caulk with black sealant. Similarly caulk perimeter edges. Appearance from outside shall be a consistent black colour.

.4 Fabricate liner panel from not less than 22-gauge galvanized sheet steel with airtight seams, brake formed at the edges. Isolate dissimilar metal surfaces using isolation coating. Reinforce with galvanized steel sections as required for rigidity and to meet design criteria, and to eliminate noises due to thermal and air pressure changes.

.5 Seal perimeter of liner panels with non-permeable sealant to maintain vapour barrier. Install weatherseal, rain deterrent and vent where detailed and required.

.6 Reinforce liner panels where necessary to prevent undue deflection.

.7 Provide sloping sills with high backs, to terminate curtain wall system at bottom. Brake form to detailed profiles.

.8 Fabricate panels in manner to maintain complete thermal and vapour barrier seal at inner panel, yet to ensure moisture is drained to exterior.

.9 Form aluminum flashing, parapet coping and cap flashing as detailed and to locations indicated. Prevent damage by window washing equipment, ladders, etc., by reinforcing edges of copings and caps.

.10 Provide sound baffles within spandrels to reduce noise transmission vertically between floors.

2.7 FABRICATION – PLENUM BOXES AND LOUVERS

.1 Fabricate and install plenum boxes built behind louvers at windows and integrate louvers with window assemblies. Fabricate and install integrated louvers. Include accessories as required for a complete installation. Coordinate with other trades as required. Colour to match curtain wall.

2.8 FABRICATION – SWING ENTRANCES

.1 Fabricate aluminum-framed glass entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors. Comply NBC 2015 criteria.

.2 Door hardware and keying: in accordance with Door Hardware Schedule. Additional miscellaneous hardware shall be manufacturer’s heavy-duty commercial quality accessories and hardware as required for a complete installation.

.3 Fabricate aluminum-framed glass doors that are re-glazable without dismantling perimeter framing.

.4 Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (29 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.

.5 Accurately fit and secure joints and corners. Make joints hairline in appearance.

.6 Prepare components with internal reinforcement for door hardware.

.7 Arrange fasteners and attachments to conceal from view.

.8 Door hardware to be supplied by door hardware contractor under the door hardware Section, to be installed by curtainwall contractor. Prepare curtainwall framing for installation of all door hardware and accessories, including but not necessarily limited to the following criteria:

.1 Exterior Doors, Semi-Automatic Swing:

.1 Concealed overhead automatic door operator.

.2 Concealed overhead door stop and holder.

.3 Pull hardware.

.4 Panic Hardware and cylinders.

.5 Continuous Hinge.

.6 Automatic retractable door sweep.

.7 Weather stripping and threshold.

.8 Flush bolts (top and bottom) - inactive leaf of pairs of doors only.

.2 Exterior Doors, Manual Swing:

.1 Concealed overhead automatic door operator.

.2 Concealed overhead door stop and holder.

.3 Pull hardware.

.4 Panic Hardware and cylinders.

.5 Continuous Hinge.

.6 Automatic retractable door sweep.

.7 Weather stripping and threshold.

.8 Flush bolts (top and bottom) - inactive leaf of pairs of doors only.

.3 Interior Doors Manual Swing Non-Exit:

.1 2 pairs of stainless steel butt hinges.

.2 Push/Pull hardware.

.3 Concealed overhead automatic door operator.

.4 Concealed overhead door stop and holder.

.5 Flush bolts (top and bottom) - inactive leaf of pairs of doors only.

.6 Cylinder lock.

.4 Interior Doors Manual Swing Exit:

.1 Pull hardware.

.2 Concealed overhead automatic door operator.

.3 Concealed overhead door stop and holder.

.4 Panic Hardware and cylinders.

.5 Continuous hinge.

.6 Automatic retractable door sweep.

.7 Weather stripping and threshold.

.5 Interior Doors - Automatic Swing:

.1 Concealed overhead automatic door operator.

.2 2 pairs of stainless steel butt hinges.

.3 Activation switches.

.4 Concealed overhead door stop and holder.

.5 Panic Hardware and cylinders at non-rated fire separations with electric strike. Push/Pull hardware at other locations.

.9 Provide all hardware of each type from one manufacturer.

.10 Keying: in accordance with Door Hardware Schedule; provide removable / exchangeable construction cores and 20 extra keys each lock for construction cores.

2.9 FABRICATION – GUARD RAILINGS

.1 Fabricate 38 mm diameter pipe railings for installation between mullions at interior in accordance with OBC requirements, including fittings, adjustable aluminum mounting brackets and flanges, with aluminum inserts, brackets and fasteners as required for a complete railing installation. Finish to match adjacent aluminum framing.

.2 Welds to be Type 1 - Ornamental Quality (no visible weld), in accordance with the Voluntary Joint Finish Standards, developed by the National Ornamental & Miscellaneous Metals Association (NOMMA).

.1 Grind or file exposed welds and steel sections smooth and flush with adjacent surfaces. Weld locations not to be visible after application of paint finishes.

.2 Ensure exposed welds are continuous for length of each joint.

.3 Weld corners and seams continuously to comply with American Welding Society (AWS) recommendations, and the following:

.1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

.2 Obtain fusion without undercut or overlap.

.3 Remove welding flux immediately.

.4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour and finish of welded surfaces match those adjacent.

.3 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

.4 Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

.5 Shop Assembly: preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

.6 Cut, reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware, screws, and similar items.

.7 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.8 Accurately form connections with exposed faces flush; mitres and joints tight.

2.10 FABRICATION – FLASHING AND ACCESSORIES

.1 Provide sloping sills with high backs, to terminate curtain wall system at bottom. Brake form to detailed profiles.

.2 Aluminum flashing: tension-levelled, commercial quality aluminum sheet in accordance with ASTM B209 and ANSI H35.1 alloy designation 5005 H14 or 3003 H14 as required, finished to match adjacent framing.

.1 Form sheet materials to profiles required.

.2 Form aluminum flashing, parapet coping and cap flashing as detailed and to locations indicated. Prevent damage by window washing equipment, ladders, etc., by reinforcing edges of copings and caps.

.3 Fabricate in accordance with AAI Aluminum Sheet Metal Work in Building Construction. Back-paint aluminum flashing in contact with concrete or masonry, or dissimilar metal, with bituminous paint prior to installation.

.4 Form sections square, true, and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Strengthen free edges of flashings by folding to form a 13-mm hem.

.6 All bends machine made. Form sections square, true, and accurate to size, free from distortion and other defects detrimental to appearance or performance.

2.11 FINISHES

.1 Aluminum Finishes:

.1 Exposed Aluminum: refer to Schedules on Drawings.

.1 Curtain Wall Framing and Doors:

.2 Coloured Anodized Finishes (both exterior and interior faces to be same colour):

.1 AL-1 Black: Exposed aluminum surfaces shall be Aluminum Association (AA) Architectural Class I, 0.7 mils minimum thickness, AA M12C22A44, colour to match Kawneer #29 – Black.

.2 AL-2 Exposed aluminum surfaces shall be Aluminum Association (AA) Architectural Class I, 0.7 mils minimum thickness, AA M12C22A44: match mineral fibre cement siding, Type FC-1, as closely as possible.

.2 Unexposed aluminum: Mill finish.

.2 Steel exposed to exterior conditions that is on cold-in-winter side of air/vapour barrier, but not exposed to view, shall be blast cleaned and hot dip galvanized in accordance with CAN/CSA G164, minimum coating mass 381 g/m^2. Thread dimensions to be such that nuts will thread over bolts without re-threading or chasing galvanized threads.

.3 Galvanize after fabrication where possible. Follow standard precautions to avoid making the base metal brittle by over pickling, overheating or during galvanizing.

.4 Colour appearance to be uniform with no variations detectable by the naked eye at a distance of 1525 mm under natural lighting.

.5 Shop and touch-up primer for steel components: SSPC 25 Paint red oxide.

.6 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.

.7 Concealed steel items: galvanized in accordance with ASTM A123 to 600 gm/m^2.

.8 Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

Part 3 Execution

3.1 EXAMINATION

.1 Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies have been corrected.

.2 Ensure that all flashings built in or provided by others integrate with system to divert moisture to exterior.

.3 Ensure that all anchor blocks or inserts required to receive system are correctly located and installed.

.4 Ensure that all anchors and setting or installing components provided by this Section for installation are properly located and installed.

.5 Ensure that building air and vapour retarding membranes can be sealed to window units to maintain system integrity. Coordinate with materials installation specified in Section 07 25 19 – Foam-In-Place Insulation and Section 07 27 13 – Air and Vapour Barriers.

3.2 PREPARATION

.1 Coordinate dimensions, tolerances, and method of attachment with other work.

.2 Supply anchorage devices and inserts to the appropriate sections where required for building in or casting-in-place and instruct as to proper location and position. Anchors shall have three-way adjustments.

.3 Remove dust and other loose material from openings.

.4 Verify that surfaces are ready to receive work and floor-to-floor dimensions are as indicated on shop drawings.

3.3 INSTALLATION

.1 Compliance: comply with AAMA CWG-1-89 recommendations, and manufacturer’s printed installation instructions, standard details as applicable, and data sheets.

.2 Use only concealed fasteners, type 304 stainless steel, unless otherwise specified.

.3 Erect all work plumb and true and in proper alignment and relationship to established lines and grades.

.4 Devices for anchoring the frame assemblies shall have sufficient adjustment to permit correct and accurate alignment. After alignment, positively secure anchorage devices to prevent movement other than those designed for expansion and contraction. Take into consideration climatic conditions prevailing at time of installation.

.5 Perform welding and drilling of concrete as required to install fixings. Repair, concrete chipped by drilling or fixing operations.

.6 Group components with shop applied finishes so that those that relate most closely to one another, with regard to colour and appearance, shall be installed adjacent to each other.

.7 Coordinate work of this section with, and provide connection for, compartmentalization of air spaces provided under other sections.

.8 Provide thermal insulation and air/vapour barriers compatible and continuous with adjacent thermal and air/vapour barrier systems.

.9 Apply continuous butyl sealing tape between sheets at lap and between steel and other materials. Screw sheets to each other and metal framing with type 304 stainless steel sheet metal screws, 6" o.c. maximum. Continuously seal perimeter of panels with tape and sealant. Place type 304 stainless steel washers over rubber washers under screw heads and cover with sealant to make fastenings air and vapour tight.

.10 Seal joints of metal, apertures and protrusions of any kind with specified sealant to produce homogeneous air/vapour barrier seal. Joints shall be air, water and weathertight.

.11 Apply silicone sealant and foam rubber joint plugs (end dams) as required at frame corners to fill and seal the joinery.

.12 Supply and install flexible, continuous gasket air/vapour barrier seals between work of this section and adjacent construction, and at deflection and expansion connections, where required. Prime substrates, apply gaskets to framing and to concrete and masonry with adhesive and retain with continuous aluminum or stainless-steel plates or bars and non-corrosive mechanical fasteners. Ensure a continuous permanent seal at joints.

.13 Provide airtight seals at penetrations in air/vapour barriers.

.14 Apply insulation to the cold in winter side of air/vapour barriers. Ensure tight butt joints.

.15 Adhere stick clips to metal air/vapour barriers at 300 mm o.c. both ways. As an alternative, gun weld pins to metal substrates in lieu of stick clips, provided clips do not easily break off and weld burn-through does not occur.

.16 Support adhesive-applied clips in place until adhesive has set.

.17 Isolate metal air/vapour barriers with thermal breaks and spacers.

.18 Locate vapour barrier on the warm-in-winter side of the insulation.

.19 Ensure a uniform, continuous thermal and vapour barrier effect. Where adjacent insulation and vapour barriers are to be provided under other sections, coordinate the work such that thermal and vapour barrier continuity is achieved. Ensure compatibility with adjacent thermal and air/vapour barrier systems. Ensure compatibility between tapes, sealants and air/vapour barriers.

.20 Cut insulation as required and fit snugly to penetrations, obstructions, openings and corners. Butt insulation boards tightly. Cut out back of board insulation as required to accommodate substrate irregularities and build up over cut out areas on the other side as required to ensure thermal barrier uniformity unless otherwise approved.

.21 Install insulation to thicknesses shown on the Drawings, or as required to achieve continuity of thermal insulation performance.

.22 Press insulation boards firmly to barrier or substrate impaling them on clips without bending clips. Butt insulation boards tightly. Install retainers to clips.

.23 Fill irregular shaped voids within assemblies with fibrous packing insulation to maintain continuity of thermal barrier.

.24 Protect exterior finished surfaces by installing snap-on caps only when building is closed in, and when the possibility of damage due to construction has been minimized, to the approval of the Consultant.

.25 Install operable windows and related hardware, at locations indicated and ensure watertight, rattle-free closure when units are in the closed and locked position. Perform drilling required to install stops and other hardware items fixed to adjacent construction.

.26 Provide structural steel framing and supports required to support work of this Section unless indicated to be supplied under other Sections. Provide structural steel support or reinforcement for anchorage of railings.

.27 Supply and install galvanized formed steel coping supports.

.28 Supply and install sheet waterproofing membrane at copings and parapets as indicated. Lap, adhere, and seal joints in membrane in accordance with recommendations of the membrane manufacturer to provide a watertight, continuous membrane.

.29 Gun-apply three continuous beads of sealant under extruded aluminum thresholds. Make bead diameter sufficient to ensure a full width seal. Remove excess sealant.

.30 Louvers and plenum boxes: install louvers and plenum boxes fully integrated with curtain wall assembly. Coordinate with other trades as required.

.31 Swing Doors and Frames:

.1 Comply with Drawings and manufacturer's printed installation instructions for installing aluminum swing entrance doors, hardware, accessories, and other components.

.2 Provide 20 mm wide x 115 mm deep aluminum sub-frame at door jambs within curtain wall at interior and exterior door openings.

.3 Coordinate with electrical for power connection and wiring to automatic door operator and controls, security devices and other work to be incorporated.

.4 Install aluminum swing entrance doors level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

.5 Set sill threshold in bed of sealant, as indicated, for weather tight construction.

.6 Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.4 FOAMED-IN-PLACE INSULATION

.1 Install between aluminum framing and rough openings at exterior walls, at perimeter joints and penetrations at curtainwall between Natatorium and adjacent interior areas, and where indicated: to Section 07 21 19 - Foamed-in-Place Insulation.

3.5 COVERS, CLOSURES, TRIM AND HANDRAILS

.1 Provide copings, covers, closures, trim and handrails as indicated and as required to provide complete and finished installation to OBC requirements.

.2 Use concealed fastenings.

.3 Fabricate aluminum components in largest practical lengths. Where joints are required, provide flush slip joints at exterior components and flush hairline joints at interior components. Unless otherwise indicated, locate joints to align with adjacent mullions and as directed by Consultant. All exterior joints to have suitable backplates and be sealed watertight.

3.6 FIELD GLAZING

.1 Install glass and insulating glass units to Section 08 50 00 – Glazing.

3.7 SEALANTS

.1 General:

.1 Seal joints between frame assemblies and adjacent construction except where specified to be done under other sections, and within glazed assemblies where required to maintain water tightness and integrity of air/vapour barrier. Seal junctions in sheet metal air/vapour barriers and between air/vapour barriers and adjacent construction.

.2 Preparation:

.1 Ensure that joint conditions are suitable for the materials to be installed.

.2 Ensure that surfaces to be sealed are sound, dry, free from dirt, water, frost, loose scale, corrosion, or other contaminants which may adversely affect the performance of the sealant materials. Remove protective oil coatings and other oil or grease films.

.3 Perform cleaning to the extent required to achieve acceptable joint surfaces.

.4 Protect cleaned and primed surfaces from further contamination by oil, dust, rain, condensation and other materials detrimental to sealant bonding strength. Re clean and re prime contaminated surfaces.

.5 Install joint filler strips as backup for sealant to provide optimum joint profile, but not less than 6 mm depth of sealant bead. Provide bond breaker tapes where required.

.6 Mask areas adjacent to the joints to prevent contamination of adjacent surfaces. Remove masking promptly after the joint has been completed.

.7 If recommended by the manufacturer of the sealant materials, prime joints to prevent staining, or to assist the bond.

.8 Apply primer with a brush which will permit all joint surfaces to be primed. Perform priming immediately before installation of sealant.

.3 Installation:

.1 Install SSG structural silicone in accordance with manufacturer's installation instructions and data sheet.

.2 Obtain approval from the sealant manufacturer for the priming, cleaning and application techniques at commencement of the sealant installation.

.3 Before sealant installation is commenced, test the sealant for adhesion to substrates.

.4 Install materials in compliance with the recommendations of their manufacturers.

.5 Do not exceed shelf life and pot life of materials, nor installation times, as stated by the manufacturer. Ensure sealant manufacturer's on-site quality control procedures are maintained.

.6 Be familiar with the work life of the sealant to be used. Do not mix multiple component materials until required for use.

.7 Mix sealants thoroughly with a mechanical mixer without mixing air into the materials. Continue mixing until the material is a uniform colour and free from streaks of unmixed material.

.8 Before any sealing is commenced, test the materials for indications of staining or poor adhesion.

.9 Sealants shall be of gun grade or knife grade consistency to suit the joint condition. Use gun nozzles of the proper sizes to suit the joints and the sealant material.

.10 Install sealant with pressure operated guns.

.11 Use sufficient pressure to fill all voids and joints full. Sealants shall bond to all sides of joint except where filler or bond breaker material is used. Where filler or bond break material is used, sealant shall bond to both sides of joints and shall not adhere to the filler or bond break material.

.12 Ensure that the correct sealant depth is maintained. Superficial painting with a skin bead will not be accepted.

.13 Sealant installations shall be a full bead free from air pockets and embedded impurities and having smooth surfaces, free from ridges, wrinkles and sags.

.14 After joints have been completely filled, tool them neatly to a slightly concave surface.

.15 If joints are masked, remove masking immediately after tooling and before sealants begin to cure.

.16 Install exposed structural silicone sealants at glazing so that top surfaces of the beads are formed to drain water away from the glass.

.17 Clean excess sealants from glass and framing surfaces immediately after installation.

.18 Cover all fasteners penetrating the air/vapour barriers with sealant.

.19 Immediately clean adjacent surfaces that have been soiled and leave work in a neat, clean condition. Remove excess materials and droppings using recommended cleaners and solvents.

3.8 FIELD QUALITY CONTROL

.1 Field Tests: to Section 01 29 83 - Payment Procedures Testing Laboratory Services, conducted by Owner's third-party testing agency if elected. Consultant may, at its sole discretion, select portions of the installation to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. If elected, conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.

.1 Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency.

.2 Air Infiltration Tests: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft^2, whichever is greater.

.3 Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 10 psf (479 Pa).

.2 Manufacturer's Field Services: Provide periodic site visit by manufacturer's field service representative.

.1 Schedule site visits to review work at stages listed:

.2 After delivery and storage of vapour retarder and components, and when preparatory work on which work of this Section depends is complete, but before installation begins.

.3 Once during progress of work.

.4 Upon completion of work of this section and prior to pouring of concrete.

.5 Obtain reports within three days of review and submit immediately to Consultant.

3.9 ADJUSTING

.1 Adjust operating entrances, hardware and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

.2 Replace defective materials and materials damaged due to faulty installation, careless handling or other causes resulting from work of this section.

.3 Upon completion of the work and just prior to final review, or at a time as directed, inspect units for damage and correct same immediately.

.4 Test and adjust hardware and replace or repair faulty items.

.5 Adjust weather-stripping to leave each opening unit in its most watertight position.

.6 Test operable elements and ensure easy and smooth operation.

3.10 CLEANING

.1 Cleaning of aluminum components shall be to AAMA 609.

.2 Remove protective material from pre-finished aluminum surfaces, interior and exterior.

.3 Remove, as work progresses, corrosive and foreign materials that may set or become difficult to remove at time of final cleaning or that may damage members. Inspect minimum monthly to ensure cleanliness.

.4 Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

.5 Wash exposed surfaces with a pre-approved cleaning solution approved by manufacturers of glass and aluminum. Take care to remove dirt from corners. Wipe surfaces clean.

.6 Select, apply and maintain cleaning and protective methods to ensure finishes will not become uneven or impaired as a result of unequal exposure to light and weathering conditions.

.7 Perform final cleaning after completion of entire installation when approved by the Consultant. Remove dirt and stains where such does not respond to the washing or cleaning specified in Section 01 74 11 – Cleaning, refer the condition to the Consultant, with recommendations as to the remedial action required; but do not undertake any cleaning procedure of a more severe nature without the written approval.

.8 Cleaning shall include the interior/exterior surfaces of materials installed under this section.

.9 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

.10 Final cleaning shall be performed under work of Section 01 74 11 – Cleaning.

.11 Upon completion of the work of this section, remove debris, equipment and excess material resulting from the work of this section from the site.

.12 Provide the Owner with instructions for proper method and materials to be used in maintenance cleaning of finished surfaces.

.13 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.11 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 13 – Metal Doors and Frames

.2 Section 08 44 13 – Glazed Aluminum Framing Systems

.3 Section 08 71 10 – Door Hardware Groups

.4 Drawings.

.5 Schedules.

1.2 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).

.1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.

.2 Builders Hardware Manufacturers Association (BHMA)

.1 Directory of Certified Products.

.3 Door and Hardware Institute (DHI)

.1 Sequence and Format for the Hardware Schedule.

.2 ANSI/DHI A115.IG, Installation Guide for Doors and Hardware.

.4 International Code Council (ICC)

.1 ICC A117.1-209, Standard for Accessible and Usable Buildings and Facilities.

1.3 REGULATORY REQUIREMENTS

.1 Meet or exceed the requirements of the Ontario Building Code as amended.

.2 All doors in a fire separation shall be equipped with a self-closing device to return the door to the closed position after each use, and equip swing type doors with a positive latching device that holds the door in a closed position.

.3 Equip exterior doors leading from an exit with panic hardware.

.4 A door equipped with a latching mechanism in an access to an exit from a room or suite of assembly occupancy containing an occupant load more than 100 persons shall be equipped with a device that will release the latch and allow the door to swing wide open when a force not more than 38 N for exterior doors or 22 N in case of interior doors is applied to the device in the direction of travel to the exit.

.5 Do not equip doors that require panic hardware by Code with electromagnetic locking devices that prevent emergency egress.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: prior to ordering Products or commencing work on site, convene pre-installation meeting in accordance with Section 01 32 16 - Construction Progress Schedule in order to accomplish the following:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building trades.

.4 Identify Owner’s keying requirements, and any special requirements resulting from Owner’s purchasing and maintenance policies and procedures.

1.5 ACTION AND INFORMATION SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and data sheets.

.3 Samples:

.1 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number. After approval samples will be returned for incorporation in the Work.

.4 Hardware List:

.1 Submit contract hardware list.

.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.3 Coordinate with other trades as required.

.4 Submit an individual drawing in CAD format depicting arrangement of access control and security components, conduit, and cabling.

.5 Keying Schedule:

.1 Submit keying schedule prepared by or under the supervision of qualified Architectural Hardware Consultant (AHC), detailing Owner's final keying instructions for locks, including schematic keying diagram and index each key set to unique door designations.

.6 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.7 Closeout Submittals

.1 Provide operation and maintenance data for door closers, locksets, door holders, electrified hardware and fire exit hardware for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.6 MAINTENANCE MATERIAL

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00 –Closeout Submittals.

.2 Supply two sets of wrenches for door closers, locksets, and fire exit hardware.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.2 Storage and Protection:

.1 Store finishing hardware in locked, clean and dry area.

1.9 WARRANTY

.1 Provide written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

.2 Failures include, but are not limited to, the following:

.1 Structural failures including excessive deflection, cracking, or breakage.

.2 Faulty operation of operators and door hardware.

.3 Deterioration of metals, metal finishes, and other materials beyond normal weathering.

.3 Warranty Period: from date of Substantial Performance, and as follows:

Hardware Type	**Warranty Term**
Locks, latches and cylinders	2 years
Closers	10 years
Hinges	Lifetime
Panics	3 years
Miscellaneous	1 year
Electrical Hardware:	1 year

Part 2 Products

2.1 PERFORMANCE AND DESIGN CRITERIA

.1 Work of this specification Section shall meet or exceed the requirements published in the following BHMA standards:

.1 Builders Hardware Manufacturers Association (BHMA)

.1 BHMA A156.1-2016, Butts and Hinges.

.2 BHMA A156.2-2011, Bored and Preassembled Locks and Latches.

.3 BHMA A156.3, American National Standard for Exit Devices.

.4 BHMA A156.4-2013, Door Controls - Closers.

.5 BHMA A156.5-2014, Auxiliary Locks and Associated Products.

.6 BHMA A156.6-2015, Architectural Door Trim.

.7 BHMA A156.8-2015, Door Controls - Overhead Stops and Holders.

.8 BHMA A156.10-2011, Power Operated Pedestrian Doors.

.9 BHMA A156.12-2013, Interconnected Locks and Latches.

.10 BHMA A156.13-2012, Mortise Locks and Latches, Series 1000.

.11 BHMA A156.14-2013, Sliding and Folding Door Hardware.

.12 BHMA A156.15-2015, Release Devices - Closer Holder, Electromagnetic and Electromechanical.

.13 BHMA A156.16-2013, Auxiliary Hardware.

.14 BHMA A156.17-2014, Self-Closing Hinges and Pivots.

.15 BHMA A156.18-2016, Materials and Finishes.

.16 BHMA A156.19-2013, Power Assist and Low Energy Power Operated Doors.

.17 BHMA A156.20-2012, Strap and Tee Hinges and Hasps.

.18 BHMA A156.21-2014, American National Standard for Thresholds.

.19 BHMA A156.26-2012, Continuous Hinges.

2.2 MATERIALS

.1 Use one manufacturer's products only for similar items.

.2 The product numbers listed in the Door Hardware Schedule on Drawings are to be used as the standard of acceptance for all items. Other manufacturer’s products will be considered provided they meet or exceed the performance, grade, quality, function, weight, design and finish of the specified product, and requests for approval are approved by the Consultant in writing through issued addenda 7-days prior to tender closing.

2.3 DOOR HARDWARE

.1 Door Hardware: supply and install door hardware as listed in Section 08 71 10.20 - Interior Door Hardware Groups and Section 08 71 10.10 - Door Hardware Groups. Coordinate with Drawings and Schedules on Drawings. If an item is not specified that in the installer’s opinion and trade experience would be advisable, notify Consultant and obtain written direction before ordering Products.

2.4 FASTENERS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.5 KEYING

.1 Meet with the Owner to finalize keying requirements and obtain keying instructions in writing. Interior locks and cylinders shall be furnished to the existing master key system.

.2 Provide temporary lost ball construction keying system during construction period.

.3 Permanent cylinders to be keyed by factory, combined in sets or subsets, master keyed or great grand master keyed, as directed by Owner. Permanent keys, key blanks and cylinders are to be stamped with the keyset symbol for identification. Stamp cylinders

with concealed visual keying for added security. These visual key control marks or codes will not include the actual key cuts. Furnish the following to project company, owner;

.1 Keys: 6 per cylinder/core, Keyed alike groups, 6 keys per KA, unused keys furnish blanks to owner.
.2 Construction Keys: 50, furnish to Building Manager.
.3 Master Keys: 150, furnish to Owner.
.4 Unused balance of key blanks shall be furnished to Owner with the cut keys.

.4 Provide a complete cross-index system, place keys on markers and hooks in the cabinet as determined by the final key schedule. Provide one each key cabinet, hinged panel type cabinet for wall mounting. See hardware groups for model number.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed installation instructions, data sheets, standard details, and specifications.

.2 Furnish ‘Related Sections’ manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.2 Where doorstop contacts door pulls, mount stop to strike bottom of pull.

.3 Install key control cabinet.

.4 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.5 Remove construction cores when directed by Owner, install permanent cores and check operation of locks.

3.3 INSTALLATION: AUTOMATIC SWING DOOR OPERATOR

.1 Install components as indicated on drawings and as scheduled to manufacturer's recommendations.

.2 Install door holders to limit doors to opening swing specified.

.3 Install operators on interior side of exterior entrances.

.4 Install rubber dampening-devices to sound isolate operators from doorframes.

.5 Isolate aluminum surfaces from contact with cementitious materials, using thick coating of bituminous paint. Let paint dry before installation of aluminum component.

.6 Conceal wiring between activating devices, electric locking system, and operators.

3.4 ADJUSTING

.1 Adjust door hardware, operators, closures, and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

3.5 DEMONSTRATION

.1 Keying System Setup and Cabinet:
- .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
- .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
- .3 Lock key cabinet and turn over key to Owner.

.2 Maintenance Staff Briefing:
- .1 Brief maintenance staff regarding:
  - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
  - .2 Description, use, handling, and storage of keys.
  - .3 Use, application and storage of wrenches for door closers, locksets, and fire exit hardware.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.8 SCHEDULE

.1 Refer to door hardware schedule.

.2 Coordinate with electrical trades as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 13 - Metal Doors and Frames.

.2 Section 08 71 00 - Door Hardware.

.3 Section 06 20 00 - Finish Carpentry.

.4 Refer to Door Schedule on Architectural Drawings.

.5 Refer to Door Elevations on Architectural Drawings.

.6 Refer to Millwork on Architectural Drawings.

1.2 DOOR HARDWARE GROUPS

.1 Coordinate power requirements with electrical drawings and specifications.

.2 Match lever design and keying requirements to owners standards before ordering.

Hardware Group No. 001

For use on Door DA1-25A

Provide each door with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 5 X 4.5	652	IVE
1	PERMANENT K/L CYLINDER	BY OWNER	626	
1	SGL CYL DEADBOLT	B660P	626	SCH
1	MONITOR STRIKE	LSM-1	630	SEC
1	DOOR PULL	CBH 7238-1 #3 MTG	630	CBH
1	MOUNTING PLATE	9530-18	689	LCN
1	SURF. AUTO OPERATOR	9531 AS REQ (120/240 VAC)	ANCLR	LCN
1	SWITCH	8310-806R		LCN
2	ACTUATOR, TOUCHLESS	8310-813	BLK	LCN
1	WALL STOP	WS406/407CVX	630	IVE

Mode of operation

Door is closed and unlocked. Pressing actuators will begin sequencing of the automatic operator when door is locked and deadbolt is thrown, monitor strike will shunt power to the actuators not allowing automatic operator sequencing to begin

Hardware Group No. 002

For use on Doors DA1-25B & DA1-25C

Provide each door with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	CONT. HINGE	112XY	628	IVE
1	DEADLATCH	MS1850 (BACKSET:)	628	ADA
1	THUMBTURN	4066	628	ADA
1	PERMANENT MORTISE CYLINDER	BY OWNER	626	
1	MORTISE CYLINDER	20-013 CMK	626	SCH
1	DOOR PULL	CBH 6039 #3 MTG. FULL HEIGHT	630	CBH
1	SURFACE CLOSER	4040XP REG	689	LCN
1	FLUSH CEILING MTG PLATE	4040XP-18G	689	LCN
1	FLOOR STOP	FS439	US26	IVE

Hardware Group No. 002A (Separate Price Item #1)

For use on Doors DA1-25B & DA1-25C

Provide each door with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	HINGES	BY PC350		
1	EA	LEVER	4560	BLK	ADA
1	EA	DEADLATCH	4510 (335)	BLK	ADA
1	EA	MORTISE CYLINDER	BY OWNER	BLK	UNK
1	EA	45 DEGREE OFFSET PULL	8145EZHD 305MM STD	BLK	IVE
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	622	FAL
1	EA	MOUNTING PLATE - PS	SC80-18	622	FAL
1	EA	WALL STOP	WS406/407CVX	BLK	IVE

Hardware Group No. 003

For use on Door DA1-25G

Provide each door with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1 5 X 4.5	652	IVE
1	PERMANENT MORTISE CYLINDER	BY OWNER	626	
1	STOREROOM LOCK	L9080P 06B CMK	626	SCH
1	SURFACE CLOSER	4040XP REG	689	LCN
1	KICK PLATE	CBH 903 200MM X LDW	630	CBH
1	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 004

For use on Doors DA1-25H

Provide each door with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	TOP TRACK	CRL70W	628	CRL
4	HANGER ASSEMBLIES	CRL70W		CRL
2	ROLLER STOPS	CRL70W		CRL
2	TOP TRACK COVER PLATES	CRL70W	628	CRL
4	TOP TRACK END CAPS	CRL70W		CRL
4	TOP TRACK LARGE SUPPORT BRACKETS	CRL70W	628	CRL
2	TRACK SEPARATORS	CRL70W	628	CRL
1	FLOOR GUIDE	CRL70W		CRL

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 73 13 - Glazed Decorative Metal Railings.

.2 Section 08 11 13 - Metal Doors and Frames.

.3 Section 08 14 16 - Flush Wood Doors.

.4 Section 08 44 13 - Glazed Aluminum Framing Systems.

.5 Section 08 87 00 - Glazing Films.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI Z97.1-2015, Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.2 ASTM International (ASTM)

.1 ASTM C542-05(2017) Standard Specification for Lock-Strip Gaskets.

.2 ASTM C716-06(2015), Standard Specification for Installing Lock-Strip Gaskets and Infill Glazing Materials.

.3 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants.

.4 ASTM C964-07(2012), Standard Guide for Lock-Strip Gasket Glazing.

.5 ASTM C1048-12e1, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

.6 ASTM C1172-14, Standard Specification for Laminated Architectural Flat Glass.

.7 ASTM C1349-17, Standard Specification for Architectural Flat Glass Clad Polycarbonate.

.8 ASTM C1503-08(2013), Standard Specification for Silvered Flat Glass Mirror.

.9 ASTM D2240-15 Standard Test Method for Rubber Property—Durometer Hardness.

.10 ASTM E330/E330M-14, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 12.1-2017, Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.3-M91(R2017), Flat, Clear Float Glass.

.3 CAN/CGSB-12.4-M91(R2017), Heat Absorbing Glass.

.4 CAN/CGSB-12.8-2017, Insulating Glass Units.

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA A440-00/A440.1-00 (R2005), A440-00, Windows / Special Publication A440.1-00, User Selection Guide to CSA Standard A440-00, Windows. Includes Update NO. 1 (2000), Update No. 2 (2006), Update No. 3 (2006).

.2 CAN/CSA A440.2-14/A440.3-14, Fenestration energy performance/User guide to CSA A440.2-14, Includes Update No. 1 (2015).

.3 CAN/CSA A440.4-07 (R2016), Window, Door, and Skylight Installation.

.4 CSA A500-16, Building Guards.

.5 CSA Certification Program for Windows and Doors.

.5 British-Adopted European Standard (BS EN)

.1 BS EN 1096-4:2004, Glass in building - Coated glass: Evaluation of conformity/Product standard.

.2 BS EN 14179-1:2016, Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 1: Definition and description.

.3 BS EN 14179-2:2016, Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: Evaluation of conformity/Product standard.

.6 Glass Association of North American (GANA)

.1 GANA Glazing Manual (50th Anniversary Edition).

.2 GANA Laminated Glazing Reference Manual (2009 edition).

.7 Underwriters Laboratories (UL)

.1 UL 2761, Sealants and Caulking Compounds, 10/03/2011.

.8 National Fire Protection Association (NFPA):

.1 NFPA (FIRE) 80, Standard for Fire Doors and Other Opening Protectives, 2016 Edition.

.2 NFPA (FIRE) 252, Fire Tests of Door Assemblies, 2016 Edition.

.3 NFPA 257, Fire Test for Window and Glass Block Assemblies, 2017 Edition.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting 2 weeks prior to beginning work of this Section and on-site installation, with Contractor's Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other trades.

.4 Review manufacturer's written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Coordinate with other trades as required to maintain schedule.

.2 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories, and include product characteristics, performance criteria, physical size, finish and limitations.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit duplicate 300 mm x 300 mm size samples of glass products and insulating glass units.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.

.2 Submit shop inspection and testing for glass.

.7 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.1 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Manufacturer’s technical recommendations:

.1 Perform glazing work in accordance with written recommendations from the glass manufacturer or glass fabricator.

.2 Certify glass compatibility with glazing materials (i.e. insulating glass sealants, structural sealants and silicones, gaskets, setting blocks, etc.)

.3 Designs to be analyzed for thermal stress.

.4 Provide shop inspection for glass.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.1 Provide testing and analysis of glass under provisions of Section 01 45 00 – Quality Control.

.2 Provide shop inspection and testing for glass.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect glazing and frames from damage.

.3 Protect prefinished aluminum surfaces with wrapping or strippable coating.

.4 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

.1 Environmental Requirements:

.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain a ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WARRANTY

.1 Provide manufacturers guarantee for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work.

.1 Sealed Glass Units: Replace units that exhibit failure of hermetic seal under normal use evidenced by the obstruction of vision by dust, moisture, or film on interior surface of glass: 10 Years.

.2 Mirrors: 10-year warranty that silvering will remain as initially installed.

.3 Provide warranty for glazing to include in maintenance manuals as specified in Section 01 78 00 – Closeout Submittals.

Part 2 Products

2.1 GENERAL SCHEDULE

GL-1 (IGU)	**Insulated Glass Unit**
GL-1A	*(IGU) Double-Glazed per (see 2.3 below)*
GL-1B	*(IGU) Double-Glazed per (see 2.3 below)*
GL-1C	*(IGU) Triple-Glazed per (see 2.3 below)*
GL-1D	*(IGU) Atrium Overhead (see 2.13 below)*
GL-2 (SPGL)	**Spandrel Glass**
GL-3 (GGL)	**Exterior Balcony / Guard Glass**
GL-3A	*Clear Safety Glass*
GL-3B	*Acid-Etched Safety Glass*
GL-4 (HSGL)	**Interior Guard Glass**
GL-5 (TGL)	**Tempered Glass (Interior Screens)**
GL-6 (FRGL)	**Fire-Rated Glass**
GL-7 (MGL)	**Silvered Mirror Glass (Various Sizes)**
GL-8 (CMGL)	**Convex Mirrors**
GL-9 (TSG)	**Millwork Cabinet Glass**
GL-10 (STGL)	**Stained Glass**

2.2 MATERIALS

.1 Design Requirements:

.1 Meet or exceed the requirements of the Ontario Building Code and amendments.

.2 Guards: to CSA A500.

.3 Size glass to withstand dead loads and positive and negative live loads as measured in accordance with ANSI/ASTM E330.

.4 Glass that is used or functions as a guard as defined by Ontario Building Code shall meet or exceed the standards and recommendations of CSA A500.

.5 Safety Glass: shall meet or exceed criteria and standards established by CGSB 12.1 and ANSI Z97.1 Class A.

.6 Glazing installation shall meet or exceed requirements of Ontario Building Code, with deflection less than 1/175.

.7 Glazing for Fire-Rated Door and Window Assemblies: Glass tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labelled per requirements of authorities having jurisdiction.

.8 Tempered glass at exterior balconies shall be heat soaked in accordance with EN 14179-1 and EN 14179-2.

.2 Required Edge Treatments:

.1 Concealed edges: flat belt ground and seamed.

.2 Structural Silicone Glazed (SSG) edges: flat belt ground and seamed.

.3 Butt joined edges with silicone seal: flat ground with arris.

.4 Exposed edges: flat polish with arris.

.5 At structural glass, all exposed edges shall be polished and eased with exposed corners slightly rounded.

.6 Joints at structural glass screens and smoke baffles shall be sealed using clear structural silicone sealant (SSG).

.7 Joints at guards shall be open unless otherwise noted.

.3 Clear Float Glass: to CAN/CGSB-12.3, glazing quality, thickness not less than 6 mm.

.4 Safety Glass: tempered glass to CAN/CGSB-12.1, transparent, glazing quality, thickness as required to meet ANSI Z97.1 Class A but not less than 6 mm thick. At locations where full-height glass panes are used (e.g., panes ≥ 2200 mm in height), minimum thickness shall be 10 mm.

.1 Type: 2 tempered; Class: B float.

.2 Category: ANSI Z97.1 Class A

.5 Heat-Strengthened Glass: to ASTM C1048, transparent, glazing quality, thickness not less than 6 mm.

.6 Low-emissivity (LOW-e) coating factory-applied to 2nd surface:

.1 Basis-of-Design:

.1 PPG Solarban 70XL (2) + Clear, or similar with same or better physical properties and performance characteristics.

.2 Acceptable alternates include: Cardinal LoĒ³-366, Guardian ClimaGuard 62/27, Viracon VRE 1-65, Prelco 366.

2.3 SEALED INSULATING GLASS UNITS

.1 Type GL-1A (IGU): Insulating Glass Units (IGU): meet or exceed requirements of CAN/CGSB 12.8. Units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA). Overall unit thickness shall be 25 mm using 6 mm glass thickness for individual panes. Use two-stage seal method of manufacture, as follows:

.1 Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator, super spacer bar or TDSE Intercept.

.2 Secondary Seal: polyurethane, silicone or polysulphide base sealant, filling gap between the two panes of glass at the edge up to the spacer/separator and primary seal.

.3 Outboard pane: Safety Glass, 6 mm thick, with Type LE1(Low-e) coating on 2nd surface.

.4 Inter cavity space: 13 mm space with low-conductivity spacers.

.5 Inert gas fill: ≥95% argon filled.

.6 Inboard pane: Safety Glass, 6 mm thick.

.2 Type GL-1B (IGU): Insulating Glass Units (IGU): meet or exceed requirements of CAN/CGSB 12.8. Units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA). Overall unit thickness shall be 25 mm using 6 mm glass thickness for individual panes. Use two-stage seal method of manufacture, as follows:

.1 Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator, super spacer bar or TDSE Intercept.

.2 Secondary Seal: polyurethane, silicone or polysulphide base sealant, filling gap between the two panes of glass at the edge up to the spacer/separator and primary seal.

.3 Outboard pane: Heat-Strengthened Glass, 6 mm thick, with Low-e coating on 2nd surface.

.4 Inter cavity space: 13 mm space with low-conductivity spacers.

.5 Inert gas fill: ≥95% argon filled.

.6 Inboard pane: Float Glass, 6 mm thick.

.3 Type GL-1C (IGU): Triple-Pane Insulating Glass Units (IGU): meet or exceed requirements of CAN/CGSB 12.8. Units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA). Use two-stage seal method of manufacture, as follows:

.1 Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator, super spacer bar or TDSE Intercept.

.2 Secondary Seal: polyurethane, silicone or polysulphide base sealant, filling gap between the two panes of glass at the edge up to the spacer/separator and primary seal.

.3 Outboard pane: Tempered Safety Glass, 5 mm thick, with Low-e coating on 2nd surface.

.4 Inter cavity space: 12 mm space with low-conductivity spacers.

.5 Inert gas fill: ≥95% argon filled.

.6 Intermediate pane: Heat-Strengthened Glass, 4 mm thick.

.7 Inter cavity space: 12 mm space with low-conductivity spacers.

.8 Inboard pane: laminated Safety Glass, overall 6 mm thickness.

.1 Standard of Acceptance:

.1 Pilkington Optilam™ using Safety Glass, meeting or exceeding BS EN 356, Category P2A.

2.4 SPANDREL GLASS

.1 GL-2 (SPGL): Spandrel glass: to CAN/CGSB 12.9, glazing quality, 6 mm thick.

.1 Type: 1 Tempered.

.2 Class: A-Float.

.3 Style: 3 Organic - applied silicone elastomeric.

.4 Form: M-Monolithic.

.5 Colour: shade to be selected by Consultant from manufacturer's full range.

.6 Acceptable Materials:

.1 Opaci-Coat 3000.

.2 Prel-Coat.

.3 Span-Kote.

2.5 GLAZED BALUSTRADES (GUARDS)

.1 GL-3A (GGL): Low-iron clear tempered glass, heat soaked, silvering quality, having minimal inclusions, exceeding the requirements of CAN/CGSB-12.1, and as follows:

.1 Design: to meet or exceed the requirements of Ontario Building Code and amendments, and CSA A500.

.2 Low-iron glass:

.1 Acceptable Materials:

.1 UltraClear, by Guardian.

.2 Optiwhite, by Pilkington.

.3 Starphire Ultra-Clear, by Vitro Architectural Glass.

.3 Refer to building elevations for film or enamel frit for bird safety strategies.

.4 Tempered glass at balconies shall be heat soaked, to BS EN 14179-1 and BS EN 14179-2.

.5 Thickness: thickness not less than 19 mm.

.2 GL-03B (GGL): Acid-etched low-iron clear tempered glass to produce a frosted appearance, silvering quality, heat soaked, having minimal inclusions, exceeding the requirements of CAN/CGSB-12.1, and as follows:

.1 Design: to meet or exceed the requirements of Ontario Building Code and amendments, and CSA A500.

.2 Low-iron glass:

.1 Acceptable Materials:

.1 UltraClear, by Guardian.

.2 Optiwhite, by Pilkington.

.3 Starphire Ultra-Clear, by Vitro Architectural Glass.

.3 Acid-etched at interior face to produce a frosted appearance. Submit samples to Consultant for initial selection and approval prior to ordering and/or fabricating glass.

.4 Tempered glass at balconies shall be heat soaked, to BS EN 14179-1 and BS EN 14179-2.

.5 Thickness: thickness not less than 19 mm.

2.6 INTERIOR GLASS GUARDS

.1 GL-4 (HSGL): Low-iron clear heat strengthened glass guards, silvering quality, having minimal inclusions, exceeding the requirements of ASTM C1048, and as follows:

.1 Design: to meet or exceed the requirements of Ontario Building Code and amendments, and CSA A500.

.2 Low-iron glass:

.1 Acceptable Materials:

.1 UltraClear, by Guardian.

.2 Optiwhite, by Pilkington.

.3 Starphire Ultra-Clear, by Vitro Architectural Glass.

.3 Thickness: thickness not less than 13 mm.

2.7 TEMPERED GLASS – SCREENS

.1 GL-5 (TGL): Safety Glass: tempered glass to CAN/CGSB-12.1, transparent, glazing quality, thickness as required to meet ANSI Z97.1 Class A but not less than 10 mm thick. At locations where full-height glass panes are used (e.g., panes ≥ 2200 mm in height), minimum thickness shall be 10 mm.

.1 Type: 2 tempered; Class: B float.

.2 Category: ANSI Z97.1 Class A.

.3 Thickness: ≥ 10 mm.

2.8 FIRE RATED CERAMIC GLASS

.1 GL-6 (FRGL): Fire Rated Glass: comprised of multiple layers of tempered glass ceramic, laminated with transparent intumescent materials, providing distortion free viewing through pane and as follows:

.1 Thickness: as required by manufacturer to meet structural requirements for fire rating specified.

.2 Impact Safety Rating: ANSI Z97.1 Class A.

.3 Fire Rating: 60 minutes.

.4 Labelled: Permanent logo listing name of product, manufacturer, testing laboratory, fire rating period and safety requirements.

.5 Acceptable Manufacturers:

.1 InterEdge Technologies.

.2 SAFTI Fire and Safety Rated Glass.

.3 Saint-Gobain Glass Solutions.

.4 Technical Glass Products.

2.9 SILVERED MIRROR GLASS

.1 GL-7 (MGL): Silvered mirror glass: to ASTM C1503, 6 mm thick.

.1 Type: 3C- Film reinforced (safety film backing to CPSC 16 CFR; equivalent to No. 2MT Category Two Mirror Safety Backing by C. R. Laurence or 3M.).

.2 Tint: Clear.

.3 Edges: ground and polished with arris.

.4 Size: custom, as indicated.

.5 Thickness: 6 mm.

2.10 CONVEX MIRRORS

.1 GL-8 (CMGL): premanufactured 3 mm thick acrylic convex mirrors with metal protective backing and sealed edges, recommended by manufacturer as suitable for outdoor locations (use outdoor-rated mirrors for all interior and exterior locations): convex shape shall provide panoramic view; exact locations as determined by Consultant. Supply mounting brackets, anchors and fasteners as required for complete installations.

.1 Basis-of-Design:

.1 SPVV, "Super" Outdoor Acrylic Convex Mirror, by Security Mirror Industries Limited.

2.11 MILLWORK CABINET GLASS

.1 GL-9 (TSG): Tempered Safety Glass, low-iron ultra clear glass, minimum 6 mm thick.

.1 Low-iron glass:

.1 Acceptable Materials:

.1 UltraClear, by Guardian.

.2 Optiwhite, by Pilkington.

.3 Starphire Ultra-Clear, by Vitro Architectural Glass.

2.12 STAINED GLASS WINDOWS

.1 GL-10 (STGL): Refer to Section 08 87 53.01 - Glazing Film for stained glass decorative feature applied to insulating glass units. Install decorative window film in factory or shop prior to shipping to site. Install on surface #4 (interior) of insulating glass units type GL-1A.

2.13 ATRIUM / OVERHEAD GLASS

.1 Type GL-1D (IGU): Insulating Glass Units (IGU): meet or exceed requirements of CAN/CGSB 12.8. Units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA). Overall unit thickness shall be 25 mm using 6 mm glass thickness for individual panes. Use two-stage seal method of manufacture, as follows:

.1 Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator, super spacer bar or TDSE Intercept.

.2 Secondary Seal: polyurethane, silicone or polysulphide base sealant, filling gap between the two panes of glass at the edge up to the spacer/separator and primary seal.

.3 Outboard pane: Safety Glass, 6 mm thick, with Type LE1(Low-e) coating on 2nd surface.

.4 Inter cavity space: 13 mm space with low-conductivity spacers.

.5 Inert gas fill: ≥95% argon filled.

.6 Inboard pane: laminated Safety Glass, overall 8 mm thickness.

.1 Standard of Acceptance:

.1 Pilkington Optilam™ using Safety Glass, meeting or exceeding BS EN 356, Category P2A.

2.14 ACCESSORIES

.1 Sealant: in accordance with Section 07 92 00 – Joint Sealants.

.2 Glazing sealant: Type as recommended by glazing manufacturer as required to meet or exceed performance requirements. Verify compatibility with insulating glass unit secondary sealant.

.3 Sealant for glazing between edges of glass units: one component silicone base, non-acidic, non-corrosive qualifying to ASTM C920. DC 795 by Dow Corp, Silpruf SCS 2000 Series by G.E Silicones, or similar as required to meet performance requirements.

.4 Heel bead: DC 795 by Dow Corp or Silpruf SCS 2000 Series by G.E Silicones, or similar as required to meet performance requirements.

.5 Setting blocks: Neoprene, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.

.6 Spacer shims: Neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.7 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.

.2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.8 Glazing compound for fire rated glazing materials:

.1 Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2%, designed for compression of 25% to effect an air and vapour seal.

.2 Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50% in both extension and compression (total 100%); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.1 Acceptable materials:

.1 Dow Corning Corp., Dow Corning 795

.2 General Electric Co., Silglaze-II 2800

.3 Tremco Inc., Spectrum 2

.3 Setting Blocks: Hardwood, glass width by 100 mm x 5 mm thick.

.4 Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.5 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

.9 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, black colour.

.10 Glazing clips: manufacturer's standard type.

.11 Lock-strip gaskets: to ASTM C542.

.12 Mirror attachment accessories:

.1 Stainless steel edge clips, with fastening concealed behind mirror.

.2 Mirror adhesive, chemically compatible with mirror coating and wall substrate.

.13 Other Glazing Accessories: to CAN/CSA-A440.

.14 Screws, bolts and fasteners: ASTM F738M; Type 304 stainless steel.

.15 Glass presence markers: easily removable, non-residue depositing.

2.15 FABRICATION

.1 Verify glazing dimensions on Site.

.2 Clearly label each glass light with fabricator's name, weight, quality, type and certification number. Do not remove labels until after work has been reviewed by Consultant.

.3 Accurately size glass to fit openings allowing the clearances shown on the following tables:

.1 Minimum glass clearances:

Thickness	Edge Clearance	Face Clearance
6 mm	6 mm	3 mm
over 6 mm	6 mm or 3/4 times the glass thickness, whichever is greater	

* where any dimension of glass unit exceeds 760 mm, increase minimum edge clearance by 1.5 mm.

.4 Bite of glass edge on stop:
.1 Up to 1270 mm united size: 6 mm minimum.
.2 1270 mm to 2540 mm united size: 10 mm minimum.
.3 Over 2540 mm united size: 13 mm minimum.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.
.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

1.2 COMPLIANCE

.1 Size glass to Ontario Building Code requirements and verify glass for openings are correctly sized and are within allowable tolerances. Install glass with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

.2 Work shall meet or exceed requirements of CAN/CSA A440.4, GANA Glazing Manual, and GANA Laminated Glazing Reference Manual.

1.3 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

1.4 EXTERIOR

.1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.3 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.4 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.5 Place setting blocks at ¼ points, with edge block maximum 150]mm from corners.

.6 Rest glazing on setting blocks and push against tape [and heel head of sealant] with sufficient pressure to attain full contact at perimeter of light or glass unit.

.7 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.

.8 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, to maximum 9 mm below sight line.

.9 Apply cap bead of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

1.5 INTERIOR

.1 Use method best suited to glass size, location and site conditions as recommended by GANA Glazing Manual.

.2 Wet/Dry (Tape and Sealant) Method:

.1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.

.5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

.6 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

.7 Trim protruding tape edge.

.3 Dry/Dry (Tape and Tape) Method:

.1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

1.6 INSTALLATION: MIRRORS

.1 Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.

.2 Set mirrors with clips. Anchor rigidly to wall construction.

.3 Secure mirrors with a minimum of 4 clips per piece. Provide pads to prevent direct metal-to-glass contact of clips or screws.

.4 Set in frame.

.5 Align mirrors (in multiple application) to a parallel and true plane surface to produce a true reflection across all sections.

.6 Install plumb and level.

1.7 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services: Upon Consultant's written request provide periodic site visit by manufacturer's field service representative.

1.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

1.9 PROTECTION

.1 After installation, mark light with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

.2 Protect installed products and components from damage during construction.

.3 Repair damage to adjacent materials caused by Work of this Section.

1.10 SCHEDULE

.1 Schedule: Refer to Drawings and install as indicated, and as follows:

.1 Glass types and locations as noted on Architectural Drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 80 50 – Glazing.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI Z97.1-2015, Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.2 Consumer Product Safety Commission Publications (CPSC)/Code of Federal Regulations (CFR)

.1 CPSC, 16 CFR 1201 CAT I.
.2 CPSC, 16 CFR 1201 CAT II.

.3 General Services Administration (GSA)
.1 GSA-TS01-2003, Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

.4 International Window Film Association (IWFA)
.1 WFA Visual Quality Standard for Applied Window Film 1999.

.5 Underwriters laboratories
.1 UL 972-06, Burglary resisting Glazing Material.

.6 Underwriters laboratories of Canada (ULC)
.1 ULC S332-1993(R1998), Standard for Burglary Resisting Material.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements, including locations of glazing film installation.

.2 Review methods of installation and protection.

.3 Coordination with other trades.

.4 Review manufacturer's written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit glazing film manufacturer’s printed installation instructions, technical datasheets, details, and specifications.

.3 Submit shop drawings showing methods and locations of installation.

.4 Samples:

.1 Samples for Initial Selection: Submit samples for initial selection of frosted translucent film from manufacturer’s standard range.

.2 Samples for Verification: Submit one 500 x 500 mm sample of selected film installed on 6 mm thick clear plate glass for verification.

.5 Test Reports:

.1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.

.6 Submit closeout submittals in accordance with Section 01 78 00 - Closeout Submittals.

.1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Follow manufacturers written instructions for care and maintenance of security and safety film.

.3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

1.5 QUALITY ASSURANCE

.1 Comply with International Window Film Association (IWFA) guidelines.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.2 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with section 01 61 00 - Common Product Requirements.

.2 Store products indoors in conditioned space, with ambient temperature at approximately 20 degrees C.

.3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.

.4 Remove from storage in quantities required for same day use.

.5 Store materials in accordance with manufacturers written instructions.

1.7 WARRANTY

.1 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

.2 Submit manufacturer’s warranty in accordance with the requirements of Section 01 78 00 - Closeout Submittals, made out in Owner’s name, for each Product specified.

Part 2 Products

2.1 BASIS-OF-DESIGN

.1 Coordinate Window Film types with architectural drawings and specifications.

.2 Refer to 09 05 00 - Product and Finish Key for Window Film types used in project.

.3 All Window Films to be provided from a single manufacturer.

.4 Manufacturers:

.1 3M Canada - Commercial Window Films

.2 Approved alternates.

2.2 MATERIALS

.1 Optically Frosted Privacy Film and Custom Design Film: polyester film, abrasion-resistant, scratch-resistant coating and release liner

.1 Locations: per architectural drawings and window / screen schedules.

.2 Adhesive type: pressure-sensitive.

.3 Minimum film thickness: 70 µm (2.78 mils).

.4 Must meet or exceed the properties of::

.1 3M Safety and Security Films - Safety Series:

.1 Allow roll widths up to 1830mm.

.2 TRL:

.1 Translucent Film.

.2 Allow for up to 3 opacities on project (to be selected by Consultant and Owner at time of shop drawing review).

.3 GRP:

.1 Custom Printed Graphic Pattern

.2 Allow for up to 3 full-colour custom graphics on project (to be designed and approved by Consultant and Owner at time of shop drawing review).

.2 (SEC) Safety Strip / Vision Strip: polyester film adhered to face of glass, with the following minimum performance characteristics and material properties:

.1 Install per Ontario Building Code 3.8.3.3 (15).

.2 Location: per architectural drawings and window / screen schedules.

.3 Adhesive Colour: Clear.

.4 Adhesive Type: Pressure-sensitive.

.5 Applications: Glass surfaces.

.6 Application Temperature (C): +10°C minimum (air and substrate).

.7 Design Pattern: 75 mm (3") diameter, spacing as determined by Consultant.

.8 Manufacturer's Warranty: 15 years.

.9 Opacity: Translucent.

.10 Removability: Permanent.

.11 Removal Method: removable with a heat gun at 80°C - 100°C.

.12 Surface Finish: Matte.

.13 Surface Type: Flat.

.14 Minimum Thickness (film): 50 µm.

.15 Basis-of-design materials:

.1 3M Commercial Window Films.

.3 (TRL) Privacy Film: polyester film, abrasion-resistant, scratch-resistant coating and release liner

.1 Location: per architectural drawings and window / screen schedules.

.2 Adhesive type: pressure-sensitive.

.3 Application: wet application, no bubbles permitted.

.4 Minimum film thickness: 70 µm (2.78 mils).

.5 Basis-of-design materials:

.1 3M Crystal Glass Finishes

.2 Allow selection from a full range of manufacturer's colours

.4 (GRP) Custom Printed Privacy Film: patterned polyester film, abrasion-resistant, scratch-resistant coating and release liner

.1 Custom pattern as determined by Consultant and Owner.

.2 Location: per architectural drawings and window / screen schedules.

.3 Adhesive type: pressure-sensitive.

.4 Application: wet application, no bubbles permitted.

.5 Minimum film thickness: 70 µm (2.78 mils).

.6 Basis-of-design materials:

.1 3M Fasara Glass Finish

.2 Allow selection from a full range of manufacturer's colours. Up to 20 colours in printed graphic pattern.

.3 Allow for punched elements in custom graphic pattern.

2.3 GLAZING FILM ACCESSORIES

.1 Adhesive: pressure-sensitive acrylic adhesive system as recommended by film manufacturer.

.2 Cleaners, primers and sealers: types as recommended by glazing film manufacturer.

2.4 FABRICATION

.1 To the extent practicable, shop-install glazing film:

.1 Ensure dust, grease, and chemical residue are removed from surface of glass/polycarbonate before installation of film.

.2 Examine glass/polycarbonate under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems.

.3 View glass/polycarbonate from 2.0 m minimum. Report findings to Consultant.

.1 Proceed with Work only after receipt of written approval from Consultant.

.2 Install film to panels ensuring no blisters, bubbles, scratches, edge defects or distortions. At interior windows and doors, film shall be installed on either corridor or room side as recommended by film manufacturer to suit purpose and type, or as otherwise directed by Consultant (confirm orientation with Consultant prior to installing). Cut film edges straight and square to within 3 mm of edge of panel.

.3 Deliver panels complete with film installed, with labels intact and legible, to site in accordance with Section 01 61 00 - Common Product Requirements.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed preparation and installation instructions, technical datasheets, and specifications.

3.3 INSTALLATION - SHOP INSTALLATION

.1 To the extent practicable, shop-install glazing film in accordance with item 2.3 FABRICATION of this Section 08 87 53.

.2 Install at corridor-side; confirm placement with Consultant prior to installation.

.3 Glass installation: to Section 08 80 50 – Glazing

3.4 INSTALLATION - FIELD APPLICATIONS

.1 Comply with glazing film manufacturer’s written installation instructions.

.2 Field Installation of Security Film to Glass Windows:

.1 Install film in the same manner as tested.

.2 Remove any window stops and window sealing device.

.3 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

.4 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.5 Install glazing film to glass windows ensuring no blisters, bubbles, scratches or distortions.

.3 Cut film edges straight and square.

.4 Ensure film is installed behind window stops.

.5 Cut edges 3 mm maximum from edge of glass sealing device in accordance with manufacturer's written instructions.

.6 Apply and attach film to glass in accordance with the manufacturer's written instructions.

.7 Splicing:

.1 Splice film only when glass is greater in width than film.

.2 Splice film only after receipt of written approval from Consultant.

.3 Use butt factory edges only.

.4 Install with no gaps or overlaps.

.8 Use only water and film slip solution on glass to facilitate positioning of film.

.9 Ensure removal of excess water from between film and glass.

.10 Remove left over material from work area and return work area to original condition.

3.5 FIELD QUALITY CONTROL

.1 Contractor and Consultant shall review the glazing film installations jointly in accordance with IWFA - Visual Quality Standard for Applied Window Film.

.2 Return glass with non-compliant film application to manufacturer for correction of deficiencies.

.3 Remove and replace film that shows blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2 m minimum after 30-day period.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Follow glazing film manufacturer's recommendations and instructions for cleaning procedures.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.1 Wash interior and exterior of each window, glass panel and film using cleaning solution recommended by glazing film manufacturer.

.4 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections.

.2 Refer to ‘1.3 - Basis-of-Design Products and Finishes’ below for related sections.

1.2 DESIGN AND PERFORMANCE CRITERIA

.1 The manufacturers, products, styles, colours, finishes, and other data listed in this Section are intended to convey the required Basis-of-Design intent, which is subject to the requirements of Section ‘01 62 00 - Product Options and Substitutions’.

.2 For specification sections not referenced in ‘1.3 - Basis-of-Design Products and Finishes’ below, refer to the relevant specification section for that scope of the Work and refer to the performance requirements and product information referenced therein.

.3 Basis-of-Design products are the minimum level of quality (appearance, durability, availability, cost of maintenance or replacement materials, physical properties, and performance criteria) acceptable for this Contract.

.4 Proposed alternatives and substitutions shall match the interior design intent as closely as possible, and meet or exceed the specified level of quality. Clear and sufficient evidence shall be presented at time of submission of proposals to enable comparative review; refer to ‘Section 01 62 00 - Product Options’ for requirements.

1.3 BASIS-OF-DESIGN PRODUCTS AND FINISHES

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

Section 06 20 00 - Finish Carpentry
Section 06 40 00 – Architectural Woodwork

Refer to architectural drawings and specifications for requirements related to woodwork.
Coordinate all woodwork / carpentry / casework / millwork / cabinetry with current AWMAC standards.

Mark	Notes	Manufacturer	Model / Dimensions / Finish
WD-1	Baltic Birch Plywood		Grade 'B/BB' (No knots, patches, or defects allowed); 18mm thickness per AWMAC requirements. Refer to architectural drawings for joint spacing and locations requiring exposed edges. Provide sample
PLAM-1	Plastic Laminate	Wilsonart	Colour: Birch Plywood Y0684 Finish 60
PLAM-2	Plastic Laminate	Wilsonart	Colour: Designer White D354 Finish 60

MC	Magnetic Catch	Hafele	4 - 5kg Pull Weight Article # 246.29.301 Colour: Black or White to match interior cabinet colour.
D-H	Cabinet Door Hinges	Blum	Soft-close clip top w/ Blumotion
DR-S	Cabinet Drawer Slides	Blum	Movento w/ Blumotion S Full Extension Drawers < 150mm Depth
DR-BS	Cabinet Drawer Box Slides	Blum	Legrabox Full Extension Drawers > 150mm Depth
D-P	Cabinet Door Pulls	Richelieu	SWF660 162mm length
DR-P	Cabinet Drawer Pulls	Richelieu	BP98982510 Aluminium Finish 40mm length / 25mm Centre-to-Centre
BKT-1	Counter Support Brackets	Rakks	EH-1818 (460 x 460mm)
BKT-2	Counter Support Brackets	Rakks	EH-1824 (460 x 610mm)
GR	Recessed Grommets	Hafele	Metal Cable Grommet, One-Piece, 40mm diameter
	Nylon Furniture / Cabinet Levellers and Guides	Richelieu	9 mm diameter screw type glide 34 mm long x 28 mm pad diameter
	Adjustable Shelving Hardware	Richelieu	0.25” Nickel pin rests #128180 0.25” diameter socket collar inserts. #MP129180

DIVISION 08 - OPENINGS

Section 08 11 13 - Metal Doors and Frames			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**

Refer to door schedule & elevations.	Hollow Metal Doors & Frames	Coordinate with performance specifications for Metal Doors and Frames.	Refer to drawings and door schedule.
Refer to door schedule and hardware groups.	Door Hardware	Various	Refer to: Section 08 71 00 - Door Hardware Section 08 71 10 - Door Hardware Groups

Section 08 31 00 - Access Panels			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
AP-1	Drywall Access Panel (Ceiling 460x460)	Castle Access Panels	Glass Reinforced Gypsum (GRG - Square Corner) Seamless installation in existing or proposed drywall ceiling. Colour to match adjacent ceiling finish.
AP-2	Drywall Access Panel (Ceiling 610x610)	Castle Access Panels	Glass Reinforced Gypsum (GRG - Square Corner) Seamless installation in existing or proposed drywall ceiling. Colour to match adjacent ceiling finish.

Section 08 42 29 - Sliding Automatic Entrances **Section 08 44 13 - Glazed Aluminum Framing Systems (interior / exterior)**			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
Refer to door and screen schedules	Interior aluminium screens	PC350	**Elite Glazing System** 4-7/8" Assembly Finish: Black Glazing: 10mm Tempered
Refer to door and screen schedules	Typical Non-Rated Glazed Swing Doors (no electrical devices)	PC350	**Series 500-P2** Aluminium Doors 76mm top rail 100mm bottom rail 76mm stiles Glazing: 10mm Tempered Finish: Black *Hardware: Provided by PC350*

			Refer to 08 71 00 - Door Hardware Groups

Section 08 80 50 - Glazing *Refer to Door / Window / Screen schedules for locations of assemblies listed below.*			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
GL-5 (TGL)	Glazing - Tempered Glass (Non-rated Interior Doors & Screens, min 10mm)		Refer to Section 08 80 50 – Glazing

Section 08 87 00 - Glazing Films			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
TRL	Privacy Film	3M	3M Crystal Glass Finishes (7725SE-314, dusted crystal)
GRP	Custom Printed Privacy Film	3M	3M Fasara Glass Finish Custom Graphic

DIVISION 09 - FINISHES

Section 09 21 16 - Gypsum Board Assemblies			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
GWB	Gypsum Wall Board	CGC	Various – refer to Section 09 21 16
GWB	Drywall Suspension System - Flat Ceilings	CGC	Provide all related hardware and accessories as required for complete installation.
	Reveal Molding (Mid-Wall Reveal)	Fry Reglet	DRM-625-75

	Ceiling Trim (GWB to GWB)	Fry Reglet	DRMCT-625-75
	'J' Molding (Edge Protection)	Fry Reglet	JDM-625
	"F' Molding (Ceilings - GWB @ Other)	Fry Reglet	DRMF-625-75
	'Z' Reveal (Doors & Screens)	Fry Reglet	DRMZ-625-75

WALL BASE (various sections related to walls and floors)			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
WB-RB-1	Rubber Wall Base	Tarkett	Thermoset Rubber Type TS Height: 4” Color: To be selected

Section 09 51 13 - Acoustical Panel Ceilings			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
C-2a	610 x 1220mm	Armstrong	CALLA - 2825 Colour: White Edge: Square Tegular 9/16”
C-2a	Acoustical Panel Suspension grid	Armstrong	Suprafine XL 9/16” Colour: Blizzard White

Section 09 65 16 - Resilient Flooring			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
SV-1	Vinyl Sheet Flooring	Forbo	Marmoleum Real 3146 Serene Grey

Section 09 91 00 - Painting

Mark	Notes	Manufacturer	Model / Dimensions / Finish
PT-1	Walls / Ceilings	Dulux	DLX1025-1 Commercial White
PT-2	Doors / Frames	Dulux	DLX1001-7 Black Magic

DIVISION 12 - FURNISHINGS

Section 12 36 61 - Simulated Stone Countertops			
Mark	**Notes**	**Manufacturer**	**Model / Dimensions / Finish**
	Quartz Countertop	Caesarstone	Finish: Polished Colour: 2141 Blizzard (White) Thickness: 20mm

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 41 00 - Structural Metal Studs.

.2 Section 06 10 00 - Rough Carpentry.

.3 Section 07 21 16 - Fibrous Insulation.

.4 Section 07 21 19 - Foam-in-Place Insulation.

.5 Section 07 26 00 - Vapour Retarders.

.6 Section 07 84 00 - Fire Stopping and Smoke Seals.

.7 Section 07 92 00 - Joint Sealants.

.8 Section 09 05 00 - Product and Finish Key.

.9 Section 09 22 00 - Non-Structural Metal Framing.

.10 Coordinate with other Sections as required for finishes and built-in blocking and supporting structures.

.11 Refer to Drawings.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM C475/C475M-12, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.2 ASTM C514-04(2009)e1, Specification for Nails for the Application of Gypsum Board.

.3 ASTM C557-03(2009)e1, Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.4 ASTM C840-13, Specification for Application and Finishing of Gypsum Board.

.5 ASTM C954-11, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.6 ASTM C1002-07(2013), Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.7 ASTM C1047-14, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.8 ASTM C1177/C1177M-13, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.9 ASTM C1178/C1178M-13, Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

.10 ASTM C1278/C1278M-07a(2011), Standard Specification for Fiber-Reinforced Gypsum Panel.

.11 ASTM C1280-13a, Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing.

.12 ASTM C1396/C1396M-14, Standard Specification for Gypsum Board.

.13 ASTM C1658/C1658M-13, Standard Specification for Glass Mat Gypsum Panels.

.2 Gypsum Association (GA):

.1 GA-214-17, Recommended Levels of Gypsum Board Finish.

.2 GA-216-16, Application and Finishing of Gypsum Panel Products.

.3 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 MINIMUM ACOUSTICAL REQUIREMENTS

.1 Suite-demising floors and walls shall achieve a minimum Sound Transmission Class (STC) of 55.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.

.2 Shop Drawings:

.1 Submit shop drawings showing elevations, sections and details of construction in accordance with Section 01 33 00 - Submittal Procedures and Section 01 45 00 - Quality Control.

.2 Delegated Design Requirements:

.1 For suspended ceiling applications, fire resistive rated walls, and for walls exceeding 3050 mm in height, exterior soffits, locations with two or more thicknesses of gypsum board, and acoustical ceilings (with 2 layers of gypsum board and insulation), submit shop drawings designed and sealed by a Professional Engineer (P.Eng.) licenced to practice in the Province of Ontario, showing elevations, plans, sections and details, including engineering calculations.

.2 Submit confirmation of stud thicknesses and spacings to suit spans and conditions as required to satisfy NBC and L/240 maximum deflection.

1.5 QUALITY ASSURANCE

.1 Delegated Design: Contractor shall engage the services of a Professional Engineer (P.Eng.) licenced to practice in Ontario to design and seal shop drawings in accordance with the requirements of Section 01 35 01 - Delegated Design.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Fire-Test-Response Characteristics: 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/ULC S101.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.

.2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.7 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers:

.1 CertainTeed Gypsum Canada Inc.

.2 CGC Inc.

.3 Georgia-Pacific Canada, Inc.

2.2 GYPSUM MATERIALS

.1 Standard Board: to ASTM C1396/C1396M and as follows:

.1 Type: regular and fire resistant.

.2 Size: 1200 mm x maximum practical length.

.3 Thickness: as indicated on Drawings.

.4 Ends: square cut.

.5 Edges: tapered.

.6 Acceptable materials:

.1 ProRoc Wallboard (Type X), CertainTeed.

.2 Sheetrock (Firecode), CGC Inc.

.3 Toughrock Gypsum Wallboard (Fireguard), Georgia-Pacific Canada, Inc.

.2 Wall Sheathing Board: to ASTM C1177/C1177M and as follows:

.1 Type: regular and fire resistant.

.2 Size: 1200 mm x maximum practical length.

.3 Thickness: as indicated on Drawings.

.4 Edges: square.

.5 Acceptable materials:

.1 Dens-Glass Gold, Georgia-Pacific Canada, Inc.

.2 GlasRoc Exterior Sheathing, Certain Teed.

.3 Securock Glass Mat Sheathing, CGC Inc.

.3 Mould-Resistant Board: to ASTM C1396/C1396M, mould resistance to ASTM D3273, and as follows:

.1 Type: regular and fire resistant.

.2 Size: 1200 mm x maximum practical length.

.3 Thickness: as indicated on Drawings.

.4 Acceptable materials:

.1 CGC Inc., Fiberock Aqua-Tough Interior Panels

.2 Georgia Pacific Canada, Inc., DensArmor Plus Interior Panels

.4 Water-Resistant Gypsum Backing Board: to ASTM C1178 and as follows:

.1 Type: regular and fire resistant.

.2 Size: 1200 mm x maximum practical length.

.3 Thickness: as indicated on Drawings.

.4 Acceptable materials:

.1 Diamondback (Type X), CertainTeed.

.2 DensShield (Fireguard) Tile Backer, Georgia Pacific

.3 Fiberock Aqua-Tough Interior Panel Abuse Resistant (Type FRX), CGC Inc.

.5 Gypsum Shaft Liner Board: to ASTM C1658/C1658M and as follows:

.1 Type: ULC fire rated.

.2 Faces: fibreglass.

.3 Size: maximum permissible length and width.

.4 Thickness: 25 mm or thickness to suit manufacturer's standard system and fire rating indicated on Drawings.

.5 Ends: square.

.6 Edges: bevelled.

.7 Acceptable materials:

.1 DensGlass Shaftliner, Georgia-Pacific Canada, Inc.

.2 GlasRoc Shaftliner, CertainTeed.

.3 Sheetrock Glass-Mat Liner Panel, CGC Inc.

.6 Acoustically Rated Board: to ASTM C1396/C1396M and as follows:

.1 Thickness: as indicated on Drawings.

.2 Edges: tapered.

.3 Acceptable materials:

.1 QuietRock as distributed by CertainTeed.

.7 Abuse Resistant Gypsum Board: high-density, paperless gypsum panels with cellulose fibre reinforced facers and reinforcing fiber mesh to ASTM C1629/C1629M and ASTM C1278/C1278M and as follows:

.1 Type: regular and fire resistant as required.

.2 Thickness: as indicated on Drawings.

.3 Surface Abrasion: Level 1 classification in accordance with ASTM C1629.

.4 Indentation Resistance: Level 1 classification in accordance with ASTM C1629.

.5 Soft Body Impact Resistance: Level 3 classification in accordance with ASTM C1629.

.6 Hard Body Impact Resistance: Level 3 classification in accordance with ASTM C1629.

.7 Acceptable materials:

.1 Fiberock VHI Aqua-Tough Abuse Resistant Interior Panel (Type FRX), CGC Inc.

2.3 FRAMING MATERIALS

.1 Metal stud framing, suspension systems and framing accessories and ancillary products: as specified in Section 09 22 00.

.2 Submit engineering report, prepared by Contractor's Delegated Design Engineer, for each floor, confirming steel thicknesses and sizes to suit spans and conditions.

.3 Provide engineered shop drawings as specified.

2.4 INSULATION MATERIALS – EXTERIOR WALLS

.1 Batt insulation: refer to Section 07 21 16 – Fibrous Insulation.

.2 Board insulation: refer to Section 07 21 13 – Board Insulation.

2.5 INSULATION MATERIALS – INTERIOR WALLS

.1 Fibrous Acoustical Insulation for Fire and Smoke Rated Assemblies: Un-faced preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ULC S702; having maximum flame spread and smoke developed of 20/20 in accordance with CAN/ULC S102 and being non-combustible in accordance with CAN/ULC S114 and as follows:

.1 Type: 1.

.2 Width: to friction fit in stud spaces.

.3 STC Ratings: as indicated on Drawings.

.4 Thickness: to fill a minimum of 90% of the cavity thickness.

.5 Nominal density: 40 kg/m^3.

.6 Acceptable materials:

.1 Owens-Corning Canada Inc., Sound Attenuation Fire Batts.

.2 Roxul Inc., Roxul AFB Acoustical Fire Batt.

.2 Fibrous Glass Acoustical Insulation for Non-Rated Assemblies: Un-faced, preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ASTM C423, ASTM E90, ASTM E413 and ULC S702 and as follows:

.1 Type: 1.

.2 Width: to friction fit in stud spaces.

.3 STC Ratings: as indicated on Drawings.

.4 Thickness: to fill a minimum of 90% of the cavity thickness.

.5 Acceptable materials:

.1 CertainTeed, NoiseReducer, Sound Control Fibre Glass Batts.

.2 Johns Manville, Sound Shield Glass Fibre Batts.

.3 Owen-Corning Canada Inc., Quietzone Acoustic Insulation.

2.6 CEILING/WALL ACCESS DOORS

.1 Architectural, flush mounting access panels for gypsum board installation, thickness, and fire rating to match wall assembly, manufacturer's standard sizes selected to suit access requirements, complete with extruded aluminum frame, concealed hinge and a removable door panel, airtight gasket, and cylinder keyed latch mechanism. Confirm proposed location and number of access doors with Consultant prior to ordering and installation.

.1 Refer to Section 08 31 00 - Access Panels.

2.7 ACCESSORIES

.1 Screws; for gypsum board: bugle head, fine thread, self-tapping, Type S or S-12 point to suit stud gauge, with corrosion resistant finish. Screw sizing:

.1 #6 x 25 mm (1") for single thickness board fastening.

.2 #6 x 32 mm (1-1/4") for single thickness 15.9 mm (5/8") board fastening.

.3 #7 x 41 mm (1 5/8") for double thickness board fastening.

.2 Screws; for soffit board and cement board: Wafer head, Type S-12 point or 'Hi-Lo', self-tapping, with corrosion resistant polymer finish.

.3 Screws; for exterior sheathing board: Wafer heads with countersinking ribs to prevent strip-out, self-drilling points, self-tapping, Clima-Seal (copolymer coating) finish.

.1 #8 x 32 mm (1-1/4") for single thickness board fastening.

.2 #8 x 41 mm (1-5/8") for double thickness board fastening, unless otherwise required.

.4 Tie wire: 1.6 mm (0.063") diameter galvanized soft annealed steel wire.

.5 Stud adhesive: to CAN/CGSB-71.25.

.6 Laminating compound: as recommended by manufacturer, asbestos-free.

.7 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one-piece length per location. Gypsum board corner bead vertical corners shall be 3/4" round. Provide transition caps at the base and head, by Trim-Tex or similar.

.8 Shadow mould: 35 mm high, snap-on trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin enamel, white colour.

.9 Strippable Edge Trim: Extruded PVC with pre-masked L-shaped tape on trim with tear away protective serrated strip for removal after compound and paint is applied, for use at areas where gypsum butts aluminum frames and where gypsum butts concrete or concrete block.

.10 Vinyl mouldings: mouldings for joint treatment at locations to be treated with Vinyl Coated Wall Coverings, as supplied by gypsum board manufacturer.

.11 Cornice cap: 12.7 mm deep x partition width, of [1.6 mm base thickness galvanized sheet steel, prime painted] [extruded aluminum, minimum 2.5 mm thick, clear anodized to Aluminum Association Architectural Class II, AA-M12C22A31. Include splice plates for joints.

.12 TRIM-TEX 093V 10' Expansion/Control joint.

.13 Acoustic sealant: non-hardening, non-skinning, permanently flexible and having VOC content less than the VOC limits of State of California’s South Coast Air Quality Management District Rule #1168.

.14 Insulating Strip: rubberized, moisture-resistant, 3 mm thick closed cell neoprene or EPDM, full width of stud, with self-sticking permanent adhesive on one face, lengths as required.

.15 Joint Treatment Materials: Provide joint compound and accessory materials in accordance with ASTM C475 and as follows:

.1 Joint Tape:

.1 Interior Gypsum Board: Paper.

.2 Exterior Gypsum Soffit Board: Fibreglass mesh tape.

.3 Tile Backing Panels: As recommended by panel manufacturer.

.2 Joint Compound for Interior Gypsum Board: Vinyl based, non-asbestos, low dusting type compatible with other compounds applied on previous or for successive coats, and as follows:

.1 Pre-filling: Setting type taping compound.

.2 Embedding and First Coat: Drying type compound.

.3 Fill Coat: Drying type compound.

.4 Finish Coat: Drying type, sandable topping compound.

.5 Skim Coat: Drying type, sandable topping compound.

.6 Acceptable Materials:
.1 CertainTeed Dust Away
.2 CGC Dust Control

.3 Joint Compound for Tile Backing Panels:

.1 Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.

.4 Joint Compound for Interior Mould Resistant Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

.1 Pre-filling: Setting type joint compound.

.2 Embedding and First Coat: Setting type joint compound.

.3 Fill Coat: Setting type, sandable topping compound.

.4 Skim Coat: Setting type joint compound, sandable topping compound.

2.8 FINISHES

.1 Coordinate proposed finishes with drawings.

.2 Coordinate proposed finishes with Section 09 05 00 - Product and Finish Key.

.3 Paint: to Section 09 91 00 – Painting.

.4 Tiling: to Section 09 30 13 – Tiling.

.5 Vinyl Coated Wall Coverings: to Section 09 72 16 – Vinyl Coated Wall Coverings

.6 Sanitary Wall Panels: to Section 10 25 00 – Sanitary Wall Panels.

Part 3 Execution

3.1 COMPLIANCE AND GENERAL PROVISIONS

.1 Comply with manufacturer’s printed installation instructions and illustrations, technical datasheets and specifications.

.2 Install and finish gypsum board in accordance with ASTM C840 and GA-216, except where specified otherwise.

.3 Install gypsum sheathing assemblies in accordance with ASTM C1280, except where specified otherwise.

.4 Install hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840, except where specified otherwise.

.5 Work shall meet or exceed OBC requirements.

.6 Suite demising floors and walls shall achieve a minimum Sound Transmission Class (STC) of 55. Erect, soundproof, and acoustically seal as required to meet this minimum requirement.

.7 Suite Demising Walls:

.1 Studs shall be erected at 406 mm or 610 mm on centre.

.2 Resilient channels shall be spaced at 610 mm on centre.

.3 Resilient channels shall be installed to acoustically separate gypsum board from studs.

.1 Locate resilient channels at corridor side where channels are installed at corridor/suite walls.

.4 Cavities between studs shall be filled minimum 90% full with acoustic batt insulation.

.5 Perimeter joints shall be sealed with acoustical sealant.

.6 Electrical boxes and other wall inserts at each wall facing shall be offset so they are never back-to-back.

.7 Continue suite demising walls through the inner layer of corridor walls to just short of the corridor layer, and close with firestop.

.8 Continue suite demising walls through exterior wall assembly to just short of the sheathing layer behind precast sections and spandrel panels, and close with firestopping. Close cavity with firestop.

.9 Fully seal.

3.2 ERECTION

.1 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.2 Install work level to tolerance of 1:1200.

.3 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.4 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.5 Furr gypsum board faced vertical bulkheads within and at termination of ceilings.

.6 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.7 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

.8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.10 Erect drywall resilient furring transversely across studs and joists spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.

.11 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Before application of gypsum board commences, ensure that internal services have been installed, tested, and approved; that conduits, pipes, cables, and outlets are plugged, capped, or covered; and that fastenings and supports installed by others are in place.

.3 Unless otherwise specified, erect gypsum board vertically or horizontally, whichever results in the fewest end joints.

.4 Apply single or double layer gypsum board as indicated to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.5 Apply gypsum board to concrete and concrete block surfaces, where indicated, using laminating adhesive.

.1 Comply with gypsum board manufacturer's recommendations.

.2 Brace or fasten gypsum board until fastening adhesive has set.

.3 Mechanically fasten gypsum board at top and bottom of each sheet.

.6 Exterior Soffits and Ceilings: Install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.

.7 Apply mould-resistant gypsum board adjacent to slop sinks and janitor’s closets, in kitchen areas and washrooms (except where tile backer boards are used at tile locations). Apply mould-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.8 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

.9 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.10 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.11 Install gypsum board with face side out.

.12 Do not install damaged or damp boards.

.13 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 ACOUSTIC WALL ASSEMBLY AND NOISE BARRIER CEILING MATERIALS

.1 Acoustical sealant and plaster:

.1 Apply two bead caulking system around horizontal and vertical perimeters of partitions. Apply continuous sealant beads at each side of horizontal runner tracks and vertical end studs, between gypsum board and adjacent construction.

.2 Apply bead of acoustic sealant to seal intersections with sound-isolating partitions that are extended to reduce sound flanking paths.

.3 Apply bead of acoustic sealant to seal joint between penetrations and gypsum board at concealed and non-rated installations only. Where exposed, use interior sealant in accordance with Section 07 92 00.

.4 Completely seal objects at wall and gypsum board penetrations (such as electrical boxes) with heavy coating of premixed perlite plaster.

.5 Apply sealant to clean, dry surfaces.

.2 Acoustic Ceiling Assemblies:

.1 Suspend gypsum board ceiling assembly on spring hangers.

.2 Install minimum 75 mm thick acoustic insulation over entire ceiling area.

.3 Ceiling: 2 layers 16mm Type X gypsum board.

.4 Seal perimeters and all penetrations through ceiling with sealant. All openings at penetrations to be oversized to avoid rigid contact.

.5 Provide acoustic ceiling assemblies at suites below amenity areas, at amenity areas, at suites below mechanical penthouse, and where indicated.

.3 Sound attenuation insulation:

.1 Install sound attenuation insulation wherever insulation in partitions is indicated.

.2 Install sound attenuation insulation in partitions so indicated by filling voids with batts of specified thickness.

.3 Maintain air space between backs of sound attenuation insulation and back of opposite face layer, as applicable.

.4 Pack sound attenuation insulation against ducts, conduits and services passing through acoustic wall assemblies.

.5 Extend acoustic wall assemblies to underside of structure. Incorporate approved provision to prevent transmittance of structural deflection to partition assembly.

.6 Install insulation by friction fit.

.7 Where studs are not faced with gypsum board on both sides, mechanically fasten wire mesh to non-faced side of stud to retain insulation.

.8 Mechanically attach sound attenuation insulation in wall assemblies where cavity of wall assembly is greater than 150 mm.

.9 Secure insulation in such a manner that it will not sag.

.4 Sound Flanking Paths:

.1 Where sound rated partition walls intersect non-rated gypsum board partition walls, extend sound rated construction to completely close sound flanking paths through non rated construction.

.2 Seal joints between face layers at vertical interior angles of intersecting partitions.

.3 Provide acoustic insulation to fill steel deck flutes where acoustic wall assemblies abut steel floor or roof deck. At non-fire rated partitions, seal gap between gypsum board assemblies and underside of deck with sealant.

3.5 ACCESSORIES

.1 At external corners install corner bead trim secured to framing at 230 mm on centre on both flanges using screw fasteners.

.2 Secure casing trim at board edges where exposed to view, where board abuts against other materials that have no trim to conceal junction, and where indicated. Secure metal reveal trim where gypsum board abuts dissimilar materials at walls and ceilings. Fasten at maximum 230 mm on centre using screw fasteners.

.3 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

3.6 INSTALLATION

.1 Install casing beads around perimeter of suspended ceilings.

.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.3 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.4 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.

.5 Construct control joints of preformed units or two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Locate control joints where indicated and at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.

.8 Install control joints straight and true.

.9 Extend board into door, window, and other openings, reveals, behind fitments, and other applied items and on metal stud partitions to structure above unless indicated otherwise.

.10 Locate joints on opposite sides of partitions on different studs, and at least 305 mm (12”) from opening jambs.

.11 Install board to minimize joints and align end joints to be the least objectionable (where they are unavoidable), according to the indicated lighting design. Locate joints in ceilings where least prominently discerned, and never line them up with opening edges.

.12 Form smooth joints at ends and at field cut edges of board panels.

.13 Fasten board to metal support members by metal gypsum board screws, 9.5 mm (0.374”) minimum to, and 12.7 mm (1/2”) maximum from, center of joints. Space screws:

.1 At fire rated board as per fire-rated assembly.

.2 At typical board walls at 305 mm (12”) on centre at edges and field unless otherwise required.

.3 At typical board ceilings at 305 (12”) on centre at edges and field unless otherwise required.

.14 Offset gypsum board seams from corners of openings.

.15 Unless otherwise shown or specified, extend gypsum board on both side of partitions to underside of structural slab above. Fasten gypsum board to studs, not to top channel. Allow for minimum 20 mm deflection.

.16 Extend gypsum board close to floor with gap between board and floor not exceeding 5 mm and with bottom edge of board straight and unbroken.

.17 Provide metal mouldings and trim at corners and terminations. Fastened with drywall screws. Provide corner beads at external corners. Provide casing beads around openings and reveal trim where gypsum board abuts dissimilar materials and construction.

.18 Adhesive bonded gypsum board; apply 13 mm x 13 mm ribbons of laminating adhesive to back side of board, parallel to long dimension; space adhesive ribbons at maximum 150 mm on centre. Temporarily brace boards until complete adhesive bond develops.

.19 Where double layer gypsum board is required, screw fasten second layer through first, into framing, offset joints.

.20 Provide gypsum backing board for ceramic tile with coated side facing away from framing.

.21 Install self-sticking resilient sponge isolation tape at edges of wall board in contact with aluminum curtainwall, aluminum windows and exterior door frames to provide a thermal break. Adhere isolation tape to casing bead and compress during installation.

.22 Provide tile backer board behind ceramic wall tile.

3.7 EXTERIOR SHEATHING BOARD APPLICATION

.1 Install in accordance with manufacturer's specifications, ASTM C1280, and GA-253 and board manufacturer's installation instructions.

.2 Seal all cut edges, ends, utility holes and fastener heads, as recommended by manufacturer. Ensure edges are butted tightly together and there are no gaps.

.3 Coordinate installation of exterior sheathing board with other trades as required.

.4 Fasten exterior sheathing board to framing with specified fasteners. Drive fasteners in field of sheathing board first, working toward ends and edges. Hold sheathing board in firm contact with framing while driving fasteners. Space fasteners a maximum of 200 mm (8") on centre along framing with perimeter fasteners at least 9.6 mm (3/8") and less than 15.9 mm (5/8") from ends and edges. For soffits up to 1220 mm (48") wide space screws up to a maximum of 150 mm (6") on centre. Drive nails and screws to bottom of heads are flush with surface of cement board to provide firm board contact with framing. Do not drive fastener heads below panel surface.

3.8 INTERIOR WATER-RESISTANT GYPSUM BACKING BOARD

.1 Install in accordance with manufacturer's specifications.

.2 Section 09 30 00 to install tile setting material over tape installed by this section. Install mesh tape centred over tile backer board joints.

.3 Apply tile backer board full height unless otherwise indicated, and in accordance with manufacturer's installation instructions. Install water barrier sheeting over gypsum board substrates, where applicable.

.4 Fastener spacing:

.1 Walls: fasten at 150 mm (6") on centre at vertical butt joints and 210 mm (*") on centre in field.

.2 Ceilings: fasten at 150 mm (6") on centre.

.3 Maintain 6 mm (1/4") gap between board and tub or shower base as applicable

3.9 FINISHING

.1 Tape and fill exposed joints, fastener heads, edges, corners, to produce an acceptable surface ready for decoration.

.2 Conceal exposed flanges of corner beads, casing beads, and other trim sections with at least 3-coats of cement, feathered out minimum 200 mm.

.3 Fill depressions at fastener head with cement, then apply 2-additional-coats of cement to produce smooth, level surface.

.4 Treat joints using 3-coat method as follows:

.5 Apply thin uniform layer of cement and embed joint tape.

.6 Immediately apply thin skim coat of cement over tape and allow to dry.

.7 Apply 2-additional coats of cement. Allow first coat to dry before applying second coat.

.8 Sand each coat of topping cement with fine sandpaper as required to produce smooth surface. Do not sand paper face of gypsum board.

.9 Finish concealed joints at fire rated and at acoustically insulated gypsum board elements. Provide tape and one coat of cement.

.10 Do not finish joints at ceramic tile backer board. Provide 50 mm wide fibre mesh tape over joints at tile backer board. Tape over and coated with tile adhesive by Section 09 30 13.

.11 Cement board: Prepare and tape joints in accordance with manufacturer's instructions. Do not finish. Tape over and coat with tile adhesive by Section 09 30 13.

.12 Joints at sheathing board to be unfinished. Butt boards to allow for continuous air barrier membrane installation.

3.10 TRIM

.1 Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.

.2 Install metal corner beads at external corners.

.3 Install metal casing bead trim whenever edge of gypsum base would otherwise be exposed or semi exposed, and where gypsum base terminates against window, door, and curtainwall frames.

.4 Erect beads plum or level, with minimum joints.

.5 Provide metal reveal trim where gypsum board wall or ceiling abuts dissimilar materials and where indicated.

.6 Provide aluminum reveal trim at perimeter of aluminum screens and where indicated.

3.11 CONTROL, EXPANSION AND RELIEF JOINTS

.1 Control joints:

.1 Provide continuous polyethylene dust barrier behind and across control joints.

.2 Provide control joints set in gypsum board facing. Support control joints with studs or furring channels on both sides of joint.

.3 Provide control joints where indicated, where directed by Consultant, and as follows:

.1 Partitions: 7500 mm on centre, maximum

.2 Ceilings: 10 m on centre, maximum.

.4 In addition, provide control joints in locations, in consultation with Consultant, where:

.1 Partition or furring abuts a structural element (except floor) or dissimilar wall or ceiling;

.2 Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration;

.3 Construction changes within the plane of the partition or ceiling;

.4 Partition or furring run exceeds 10 m (30’);

.5 Ceiling dimensions exceed 15 m (50’) in either direction with perimeter relief, 10 m (30’) in either direction without.

.6 Wings of “L”, “U”, and “T” shaped ceiling areas are joined;

.7 Expansion or control joints occur in the base exterior wall.

.5 Line up control joints with joints in other construction or with center lines of mullions, columns, piers, or similar building elements, and where accepted by Consultant.

.6 Install control joints straight and true.

.7 Ceiling height door frames may be used as control joints. Less than ceiling height frames should have control joints extending to the ceiling from both corners. If control joints are not used, additional reinforcement is required at corners to distribute concentrated stresses.

.8 Construct through wall control joints at fire-rated assemblies in accordance with fire-rated assemblies in accordance with assembly listing requirements.

.2 Expansion joints:

.1 Provide expansion joints in gypsum board elements located at building expansion joints.

.2 Unless otherwise shown, form expansion joint by terminating gypsum board edged with casing bead on both sides of joint and backed by minimum 2.5 mm thick aluminum plate fastened on one side only. Fabricate to align with adjacent floor expansion joint cover.

.3 Relief joints:

.1 Provide relief joints where indicated and where gypsum board assemblies about dissimilar construction.

.2 Where indicated, provide other mouldings, reveals, and feature strips. Install in accordance with manufacturer's directions, plumb, level, accurately aligned at joints, and securely fastened to supporting work.

.3 At exterior wall, where gypsum board abuts curtainwall, window, and door frames, provide isolation tape between casing bead and frame.

3.12 FIRE SEPARATIONS

.1 Install fire-rated assemblies in accordance with assembly listing requirements in order to obtain fire ratings indicated and as required by authorities having jurisdiction.

.2 Vertical bulkheads in ceiling spaces over fire rated partitions, doors and the like shall have same fire rating as the partition over which they occur. Such bulkheads shall be of gypsum board construction unless otherwise indicated.

.3 Use fire rated gypsum wallboard as specified.

.4 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.5 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide gypsum board enclosure or backing to maintain required fire rating, unless otherwise detailed.

.6 Construct non-rated fire separations to same requirements as rated assembly, but use standard gypsum board.

3.13 ACCESS DOORS

.1 Install access doors to mechanical and electrical fixtures specified in respective sections.

.2 Install access doors supplied by Mechanical and Electrical Divisions and as specified in Section 08 31 00 - Access Panels in locations determined by coordination with trades installing mechanical, electrical and other building services and consultation with Consultant.

.3 Rigidly secure frames to furring or framing systems.

.4 Some access panels require gypsum board infill, coordinate with electrical and mechanical for type and location.

.5 Coordinate with Section 09 53 00.01 - Acoustical Suspension.

3.14 ROLLER SHADES

.1 Install mounting brackets for recessed roll down blinds head assembly specified in Section 12 21 16 - Roller Shades. Securely fasten to supporting substrate, at maximum 1500 mm (5 ft) spacing and at ends of each blind unit.

.2 Supply and install extruded aluminum ceiling trim at recessed blinds head assembly, continuous full length of blinds and window opening. Securely fasten trim to blind mounting brackets.

3.15 SPECIAL CLEANING

.1 Clean up and remove surplus materials and rubbish resulting from the work of this section on completion and when directed.

.2 Clean off beads, casings, joint compound droppings and the like, leave the work of this section ready for painting trades.

3.16 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.1 Prevent overspray and/or splashes to adjacent surfaces.

.2 Clean spills, splashes and/or or overspray immediately using manufacturer's recommended cleaners and procedures.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.17 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.18 BOARD SCHEDULE

.1 Use fire rated Type X or C board as required at fire rated wall and ceiling assemblies; refer to Drawings for wall and ceiling types and locations.

.1 Standard Board: general use, unless otherwise specified or indicated.

.2 Wall Sheathing Board: exterior face of exterior walls.

.3 Mould-Resistant Board: interior face of exterior walls, and at kitchens, bathrooms, basement/garage and laundry rooms, except where Water-Resistant Gypsum Backing Boar is required (e.g., at tile locations).

.4 Water-Resistant Gypsum Backing Board: wet rooms, plumbing walls, tile locations, and as indicated.

.5 Gypsum Shaft Liner Board: shaft walls.

.6 Acoustically Rated Board: at acoustically rated assemblies as required or otherwise indicated to achieve indicated STC rating.

.7 Other Work as indicated and required for a complete job; refer to Drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications.

.2 Section 06 10 10 – Rough Carpentry.

.3 Section 09 21 16 – Gypsum Board Assemblies.

.4 Refer to and coordinate with other Sections as required for in-wall blocking and support structures.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM C645-14e1, Standard Specification for Nonstructural Steel Framing Members.

.2 ASTM C754-15 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 CSA Group (CSA)

.1 CSA S136-12 Package, North American Specification for the Design of Cold Formed Steel Structural Members and S136.1-12 - Commentary on North American specification for the design of cold-formed steel structural members, Includes Update No. 1 (2014), Update No. 2. (2014), Update No. 3 (2015).

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meetings one week prior to beginning work of this Section in accordance with Section 01 32 16 – Construction Progress Schedule to:

.1 Verify project requirements.

.2 Review installation conditions.

.3 Coordinate with other building trades.

.4 Review manufacturer's instructions.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and technical datasheets for each type of product indicated.

.3 Shop Drawings:

.1 Submit shop drawings showing elevations, sections and details of construction in accordance with Section 01 33 00 - Submittal Procedures and Section 01 45 00 - Quality Control.

.2 Delegated Design Requirements:

.1 For suspended ceiling applications, fire resistive rated walls, and for walls exceeding 3050 mm in height, exterior soffits, locations with two or more thicknesses of gypsum board, and acoustical ceilings (with 2 layers of gypsum board and insulation), submit shop drawings designed and sealed by a Professional Engineer (P.Eng.) licenced to practice in the Province of Ontario, showing elevations, plans, sections and details, including engineering calculations.

.2 Submit confirmation of stud thicknesses and spacings to suit spans and conditions as required to satisfy OBC and L/240 maximum deflection.

1.5 QUALITY ASSURANCE

.1 Delegated Design: Contractor shall engage the services of a Professional Engineer (P.Eng.) licenced to practice in Ontario to design and seal shop drawings specified per item 1.3.3 of this Section in accordance with the requirements of Section 01 35 01 - Delegated Design.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

Part 2 Products

2.1 CEILING SUPPORT MATERIALS AND SYSTEMS

.1 General: Size ceiling support components to comply with ASTM C754 and OBC unless otherwise indicated.

.2 Protective Coating: to ASTM A653 G60 hot dipped galvanized.

.3 Main Runners: steel channels, galvanized Z180, hot or cold rolled; Z275 hot dipped galvanized where used in high-humidity environments (e.g. shower rooms, other wet areas and outdoors).

.4 Hanger Wire: to ASTM A641, soft, Class 1 galvanized generally, stainless steel in high-humidity environments (e.g. shower rooms, other wet areas and outdoors); minimum 4.064 mm (8 IWG).

.5 Hanger Rods and Flats: mild steel with zinc coating.

.6 Hanger anchoring devices:

.1 Screws, clips, bolts, concrete inserts or other devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through field-tested and conventional construction practices or by certified tests data. Size devices for 4X calculated load supported except size direct pull-out concrete inserts for 5X calculated loads.

.2 Interior concrete ceiling applications:

.1 Duynabolt Sleeve Anchor TW-1614 or Readi-Tie-Drive TD4-112 tie-wire anchor by ITW Ramset/Red Head.

.2 Trubolt or Dynabolt anchors by ITW Ramset/Red Head.

.3 Kwik-Bolt II HCKB ¼ tie-wire anchor by Hilti Corporation.

.4 Kwik-Bolt II anchors by Hilti Corporation.

.3 Fasteners exposed or concealed in ceiling assemblies in high-humidity environments (e.g. shower rooms, other wet areas and outdoors):

.1 Wood ceiling anchor substrate: ITW Buildex Climaseal coated steel in applicable product lines specified in preceding paragraphs.

.2 Concrete ceiling anchor substrate: ITW Readhead Dynabolt 304 Stainless Steel with minimum 1.22 mm Z275 galvanized clip angles.

.4 Powder actuated fastening systems not permitted.

.5 Fasteners exposed to weather, condensation, corrosive conditions (e.g., exposed to de-icing salts or air-borne de-icing salt overspray from passing vehicles), high-humidity environments (e.g. shower rooms, other wet areas and outdoors):

Z275 hot dipped galvanized or type 316 stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.7 Tie-Wire: 1.65 mm (16 IWG) zinc-coated annealed wire.

.8 Furring anchorages: 16-gauge galvanized tie-wires, manufacturer's standard wire type clips, bolts, nails or screws as recommended by furring manufacturer and complying with ASTM C754.

.9 Runner (Carry) Channels: 1.6 mm thick cold rolled steel, zinc coated for interior locations, Z275 coated where exposed to weather, condensation, corrosive conditions (e.g., exposed to de-icing salts or air-borne de-icing salt overspray from passing vehicles), or high-humidity environments (e.g. shower rooms, other wet areas and outdoors):

.1 38 mm x 13 mm where supported at centres of 914 mm maximum spacing.
.2 38 mm x 19 mm where supported at centres of 1220 mm maximum spacing.

2.2 MATERIALS

.1 Maximum permitted deflection: L/240.

.2 Coordinate with other trades as required.

.3 Design Thickness, to CSA S136, and Stud Spacing:

.1 Submit Professional Engineer's (P.Eng.) confirmation of stud thicknesses and spacings to suit spans and conditions as required to satisfy OBC and L/240 maximum deflection.

.2 Non-rated Partitions: fabricated from minimum 0.478 mm thick material (Design Thickness). (Steel framing gauge no. for reference only: 25 ga.);

.1 High Span Requirements: Provide 0.84 mm thick (20 gauge) stud framing at high span areas where span requires thicker stud framing materials.

.3 Fire-Rated Partitions: fabricated from minimum 0.879 mm thick material; space studs at maximum 400 mm on centre or as otherwise indicated.

.4 At wall-mounted millwork and cabinetry, acoustical panels, toilet accessories, storage shelving, furniture and equipment, kitchen equipment and services, and other items requiring blocking and support to resist loads, supply and install the following as required to provide adequate support to resist loads:

.1 Backer Plates: 150 mm wide x 1.2 mm thick (minimum) steel backer plates in wall cut to fit and fixed to studs as required.

.2 Studs: fabricated from 0.84 mm thick material, minimum.

.3 Space studs at 300 mm on centre, or less as required.

.5 Single jamb studs at openings: fabricated from 0.84 mm thick material, minimum.

.1 Provide double stud framing at jambs.

.4 Studs shall be hot dipped galvanized steel; roll formed with knurled flanges, services and bracing cut outs.

.5 Knock-out service holes at 460 mm centres.

.6 Runners: Width, gauge and galvanizing to match steel studs, and as follows:

.1 Double Runner Deflection Track: Outside runner using 50 mm flanges; inner runner 33 mm; maintaining 25 mm minimum deflection space.

.2 Slotted Deflection Track for Fire Separations: Premanufactured slotted top runner with 63 mm down standing legs and having 6 mm wide x 38 mm high slots spaced at 25 mm on centre along length of runner; tested and certified for use in fire rated wall construction:

.1 Acceptable materials:

.1 Brady Construction Innovations, SliptrackSystems

.2 Dietrich Metal Framing, SLP-TRK

.2 Base Runner: Bottom track with 33 mm upstanding legs.

.7 Gypsum board furring channels: 0.75 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.8 Resilient clips and channels as required: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.9 Acoustical sealant: to Section 07 92 00.

.10 Insulating strip: rubberized, moisture resistant 3 mm thick cork or foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

.11 Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.12 Horizontal and Vertical Shaft Liner Framing System: to ASTM C645 manufacturer's standard shaft wall steel framing system having ASTM A653M, Z180, hot-dip galvanized zinc coating; minimum steel thickness of 0.84 mm thick (20 gauge) or heavier as required by detailed design required for indicated spans; including head and bottom rails, channels, trim and accessories required for a complete installation:

.1 Acceptable materials:

.1 Shaftwall Systems (CT Studs, J-Tabbed Tracks), by Bailey Metal Products Limited.

.2 C-H Stud Framing System, CGC Inc.

.3 C-T Stud Framing System, Georgia-Pacific Canada, Inc.

.4 Series IV – I Studs, CertainTeed.

Part 3 Execution

3.1 GENERAL

.1 Stud end bearing shall be a minimum of 25 mm.

.2 Limiting heights shall be calculated using ICC-ES AC86.

.3 Non-structural sections shall comply with ASTM C645.

3.2 ERECTION

.1 Install steel studs to ASTM C754 and to Ontario Building Code 2012 and amendments.

.2 Predrill holes for gypsum board installation where stud material thickness is too great to accept typical self-tapping screw installation methods.

.3 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.4 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.5 Place studs vertically at 400 mm on centre, or as otherwise indicated or specified elsewhere in this Section, and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross-brace steel studs as required to provide rigid installation to manufacturer's instructions.

.6 Erect metal studding to tolerance of 1:1000.

.7 Attach studs to bottom track using screws; allow for 25 mm deflection at top track, or as otherwise stipulated by the structural drawings.

.8 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs, ensure web openings are aligned.

.9 Coordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.10 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.11 Install 1.438 mm thick (Design Thickness) single jamb studs at openings.

.12 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.13 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.14 Provide 40 mm stud or Backer Plates secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.15 Install steel studs or Backer Plates between studs for attaching electrical and other boxes.

.16 Extend partitions full height to underside of structure above (with allowances for structural movement) except where noted otherwise on drawings, or as otherwise required by OBC.

.17 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.

.18 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.19 Install two continuous beads of acoustical sealant or continuous insulating strip under studs and tracks around perimeter of sound control partitions.

.20 Unless otherwise indicated, partitions, together with gypsum board facings, shall extend above ceilings to underside of structural slab or deck above.

.21 Maintain clearance to avoid transference to structural loads to studs.

.22 At fire rated and sound rated partitions, offset framing around beams and, if necessary, around ductwork running above top of partitions in order to maintain required separation.

.23 At locations where partitions extend higher than 420 mm, provide diagonal stud framing to laterally brace partition framing above ceilings.

.24 Lateral Support Bracing Channels:

.1 Stiffen partitions over 3 meters in vertical span at mid-height to maximum vertical spacing of 2400 mm on centre with at least one 19 mm horizontal bracing channel extending full length of partition, overlapping at least two stud spaces at ends of bracing channels. Secure bracing to stud framing.

.2 Stiffen partitions at not more than 150 mm from the top and bottom of openings and across two full stud spaces at each side of openings with horizontal bracing channel.

.25 Double studs with continuous wood blocking (to Section 06 10 00 - Rough Carpentry) at jambs of openings.

.26 Blocking:

.1 Attach adequate baker plates to framing as required to support the load of, and to withstand the withdrawal and shear forces imposed by, items stalled upon the

work of this Section, including but not necessarily limited to the following conditions:

.1 Washroom accessories.

.2 Cabinet work and finish carpentry.

.3 Miscellaneous specialties.

.4 Additional items indicated to be mounted on gypsum board partitions.

3.3 INSTALLATION: CEILING SUPPORT MATERIALS AND SYSTEMS

.1 Arrange hangers for suspended gypsum board ceilings to provide support independent of walls, columns, pipes, ducts; erect plumb, and securely anchored to structural frame, or embed in concrete slabs.

.2 Keep lateral braces at hangers back 450 mm (18”) unless otherwise noted.

.3 Space hangers at 914 mm (36”) on centre maximum along runner channels, and not more than 150 mm (6”) from ends.

.4 Space runner channels at 1220 mm (48”) on centre, maximum, and not more than 150 mm (6”) from boundary walls, interruptions of continuity, and changes in direction. Run channels transversely to structural framing members.

.5 Where splices are necessary, lap members at least 200 mm (8”) and wire each end with 2 loops. Avoid clustering or lining up of splices.

.6 Attach to rod hangers by bending hanger sharply under bottom flange of runner, and securely wiring in place with saddle tie.

.7 Where hangers are suspended from steel roof deck, make holes through both sides of deck troughs and pass hanger wire through and down both sides of trough. Wrap around vertical hanger rod.

.8 Erect cross furring channels transversely across runner channels at 400 mm (16”) on centre maximum, 305 mm (12”) on centre at fire rated assemblies, at not more than 150 mm (6”) from boundary wall openings, interruptions in ceiling continuity, and changes in direction.

.9 Secure furring channels to each support with purpose-made slips or wire tie. Splice joints by lapping channels and tying together.

.10 Install proprietary ceiling systems in accordance with manufacturer’s printed directions.

.11 Level cross furring channels to maximum tolerance of 3 mm in 3 m (1/8” in 10 ft.).

.12 Where ductwork, piping, and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.

.13 Erect exterior soffit framing in accordance with reviewed shop drawings. Suspend soffit framing with metal studs and brace system to withstand positive and negative wind pressures without detrimental effects. Fasten furring members to surrounding walls. Use minimum 1.2 mm thick framing members.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 - Gypsum Board Assemblies.

.2 Section 09 53 00.01 - Acoustical Suspension.

.3 Section 09 05 00 - Product and Finish key.

.4 Schedules and Legends on Drawings.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM C423-17, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.2 ASTM E1110-06(2011), Standard Classification for Determination of Articulation Class.

.3 ASTM E1111/E1111M-14, Standard Test Method for Measuring the Interzone Attenuation of Open Office Components.

.4 ASTM E1264-14 Standard Classification for Acoustical Ceiling Products.

.5 ASTM E1414/E1414M-16 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

.2 CSA Group (CSA)

.1 CSA O141-05 (R2014), Softwood Lumber.

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.

.3 Samples:

.1 Submit duplicate full-size samples of each type of acoustical unit.

.2 Include accessories and mitered interior and exterior corners of wall moulding.

.4 Shop Drawings:

.1 Submit Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.

.5 Certifications: submit manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material shall carry an approved independent laboratory classification of NRC, CAC, and AC.

1.4 QUALITY ASSURANCE

.1 Single-Source Responsibility: Provide perimeter trim components, panels and grid components by a single manufacturer.

.2 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to applied fireproofing, insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

.3 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Products shall meet or exceed Building Code requirements.

.5 Mock-up:

.1 Construct mock ups in accordance with Section 01 45 00 – Quality Control.

.2 Construct mock up 10 m^2 minimum of each type acoustical panel, tile ceiling including one inside corner and one outside corner.

.3 Construct mock up where directed.

.4 Allow 24 hours for inspection of mock-up by Consultant before proceeding with ceiling work.

.5 When accepted, mock up will demonstrate minimum standard for this work. Mock up may remain as part of the finished work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes, and other types of damage that may impair installation processes, resultant functionality, or durability of installation.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Permit wet work to dry before beginning to install (e.g., paint, caulking, etc.).

.2 Maintain uniform minimum temperature of 15 °C and humidity of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.7 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 Closeout Submittals.

.2 Provide 2 sealed cartons of each type and finish of acoustical units incorporated into the Work.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Owner upon completion of the work of this section.

1.8 WARRANTIES

.1 Contractor agrees to correct any deficiencies in labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

.2 Submit manufacturer's warranty in accordance with the requirements of Section 01 78 00 - Closeout Submittals, made out in Owner's name, for each Product specified.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

2.2 MATERIALS

.1 Gypsum Board Ceilings:

.1 Refer to Section 09 21 16 – Gypsum Board Assemblies for gypsum board ceilings.

.2 Acoustical Panel Ceilings:

.1 Coordinate with Section 09 05 00 - Product and Finish Key.

.2 Coordinate with architectural drawings and assembly schedule.

.3 Basis-of-Design Minimum Requirements:

.1 Manufacturer:

.1 Armstrong

.2 Acoustical Panels:

.1 Product: CALLA

.2 Colour: White (WH)

.3 Edge: Square Tegular 9/16"

.4 Acoustic Performance: 0.85 NRC / 35 CAC / 170 AC

.5 Dimensions: Refer to architectural drawings.

.3 Exposed Edges:

.1 Where suspended acoustical panel ceilings do not touch an adjacent wall or partition, trim pieces will be provided to create a clean, finished, perimeter.

.2 Manufacturer:

.1 Armstrong

.3 Acoustical Panel Ceiling Trim:

.1 Product: Suprafine XL 9/16”

.2 Colour: Blizzard White

.3 Choose the appropriate trim product for application. Refer to architectural drawings for proposed scope of work.

.4 Accessories: manufacturer's supplied or recommended accessories as required for a complete installation.

.5 Suspension systems: to Section 09 53 00.01 – Acoustical Suspension specifications.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed preparation and installation instructions, technical datasheets, and specifications.

3.3 COORDINATION AND SEQUENCING

.1 Coordinate and sequence work with work of other trades to ensure proper installations, maintenance of project construction schedule, and completion of necessary work that is required above suspended ceiling system.

.2 Do not install panels until work above ceiling panels has been reviewed by Consultant.

.3 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

.4 Work of Section 09 53 00.01 - Acoustical Suspension shall be coordinated, and in place as required, ready for installation of panels.

3.4 WOOD STYLE CEILING GRILLE

.1 Climatize prior to installation. Maintain relative humidity between 25% and 55% and temperatures between 50˚F and 86˚F during climatization, during and after installation.

.2 Install and hang ceiling grille assembly in accordance with manufacturer's printed installation instructions and details.

3.5 INSTALLATION

.1 Install acoustical panels and tiles in ceiling suspension system in accordance with manufacturer's printed installation instructions and details.

.2 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width with directional pattern running in same direction. Refer to reflected ceiling plan.

.3 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 05 00 - Product and Finish Key.

.2 Section 09 51 13 - Acoustical Panel Ceilings.

.3 Section 09 54 00 - Wood Grille Ceilings.

.4 Schedules.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A641/A641M-09a(2014), Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.

.2 ASTM C635/C635M-13a, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.3 ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for acoustical suspension and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 Submit reflected ceiling plans for special grid patterns as indicated.

.3 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines, change in level details, access door dimensions, and locations, acoustical unit support at ceiling fixture, and lateral bracing and accessories.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit one representative model of each type ceiling suspension system.

.4 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for acoustical suspension for incorporation into manual.

1.5 MOCK UPS

.1 Erect mock-up in accordance with Section 01 33 00.

.2 Construct in locations acceptable to Consultant a typical sample installation. Modify sample as directed and as required to obtain approval. Upon acceptance, retain sample as standard of quality for acoustical ceiling.

.3 Do not begin fabrication and erection of remainder of ceiling system until sample installation has been reviewed and accepted. Accepted sample to become a part of the final Work, subject of approval of Consultant.

1.6 CERTIFICATE OF COMPLIANCE

.1 Provide certificate of compliance stating that the suspension system provided, including materials and installation, comply with the requirements of the Contract Documents.

1.7 QUALITY ASSURANCE

.1 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Coordinate and sequence work to permit electrical, mechanical and fireproofing work to be performed before installing suspension systems. Coordinate installation and anchors and tie wire with fireproofing to ensure applied fireproofing is not compromised by installation work.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.2 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes, and other types of damage that may impair installation processes, resultant functionality, or durability of installation.

.3 Replace defective or damaged materials with new.

1.9 WARRANTIES

.1 Contractor agrees to correct any deficiencies in labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

Part 2 Products

2.1 DESIGN

.1 Design Requirements: maximum deflection: L/360 of span to ASTM C635/ASTM C635M deflection test.

.2 Subject to the requirements of Section 01 62 00 - Product Options and Substitutions, refer to schedules on Drawings suspension system requirements. Coordinate with Drawings.

.3 Design suspension system to support safely, and without distortion, the superimposed loads of:

.1 Air supply diffusers and return grilles.

.2 Lighting fixtures according to building regulations and submit permits as required under the Ontario Building Code and Canadian Electrical Code.

.4 Coordinate installation and cooperate with mechanical and electrical Subcontractors, to accommodate mechanical and electrical items, or any other work required to be incorporated in or coordinated with the ceiling system.

2.2 METAL SUSPENSION SYSTEMS

.1 Concrete hanger anchors; post installed: Steel eye bolts and nuts to suit ceiling hangers with capability to sustain, without failure, a load equal to 4 times that imposed by ceiling construction, as determined by testing per ASTM E488, conducted by a qualified independent testing laboratory.

.1 Dynabolt Sleeve Anchor 'TW-1614' or Readi-Tie-Drive 'TD4-112' tie wire anchor by ITW Ramset/Red Head.

.2 Kwik-Bolt II 'HCKB 1/4' tie wire anchor by Hilti Corporation.

.3 Fasteners exposed to weather, condensation, and corrosion, and at Pool Offices #1203C and 1203B as well as at Corridor 1203A: Zinc-plated or stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.2 Hangers: Galvanized wire, typically, special stainless steel (see item 2.2.5 below) at natatorium and any room or space contiguous with the natatorium, recommended by manufacturer of suspension system, minimum 2.66 mm diameter.

.3 Tie Wire: 1.519 mm diameter, galvanized steel wire.

.4 Metal Finish: Metal exposed in finished work shall have a pre-coated baked enamel finish in non-yellowing, flat white. Submit paint formulation of grid system to lighting fixture, speaker grille, sprinkler and diffuser manufacturers to ensure consistency of colour, sheen and texture of all exposed metal components in the ceiling assemblies.

.5 If applicable, special stainless steel requirements for natatoriums and related contiguous spaces: refer to Section 05 70 15, item 2.3 NATATORIUM SPECIAL REQUIREMENTS.

.6 Standard Suspension systems:

.1 Standard exposed or concealed grid system (per requirements of selected Acoustic Panels) and as follows:

.1 Basis-of-design: Refer to Section 09 05 00 - Product and Finish Key.

.2 Approved manufacturers:

.1 Armstrong

.2 CGC

.3 Chicago Metallic Corp

.4 Other equal system approved by consultant.

.3 Main tees: 38 mm high x 25 mm exposed face bulb section, minimum 0.5 mm thick cold rolled galvanized steel.

.4 Cross tees: 25 mm wide, minimum 0.5 mm thick cold rolled galvanized steel; profile designed to limit deflection to 1/360 of span; designed to

have suitable detail to rest on, automatically engage, level and lock to main tee.

.5 Wall moulding: pre-finished 25 mm exposed face galvanized steel shadow moulding with 13 mm reveal, #7875 by Armstrong or equal. Use preformed corner mouldings.

.6 Wall mouldings at round columns: Extruded aluminum with white finish to match ceiling grid, Fry Column Collar for acoustic ceilings with white PVC spacer.

.7 Hangers: minimum 2.5 mm galvanized steel wire.

.8 Carrying channels: minimum 1.5 mm thick cold-rolled galvanized steel channels 50 x 25 mm.

.2 Unless otherwise specified or indicated on drawings, finish for exposed metal surfaces: satin enamel white and bright white, matching acoustic panels.

.3 Provide hot dipped galvanized suspension system for high-humidity areas; confirm locations with Consultant prior to ordering materials and installing suspended ceilings (examples of high-humidity rooms are rooms like laundry, kitchen, any room with a shower stall in it, and similar). Provide white enamel finish on exposed surfaces.

.4 Suspension system accessories: Splices, clips, and perimeter shadow moulding, of manufacturer's standard type to suit the applicable conditions unless special conditions and access area are shown or specified.

.5 Ceiling trim at recessed roll down window blinds: Clear anodized extruded aluminum "T" trim, 38 mm exposed face, 19 mm vertical leg, to suit roll down blind mounting.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed preparation and installation instructions, technical datasheets, recommended details and specifications.

3.3 INSTALLATION - GENERAL

.1 Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to panel manufacturer before installation is commenced. Maintain uniform temperatures of at least 16 °C for 72 hours prior to commencement of the work of this section and maintain temperature until completion of the work of this section.

.2 Install ceiling panels and metal suspension system in accordance with manufacturer's directions. Where manufacturer's directions are at variance with Contract Documents, notify Consultant before proceeding with installation.

.3 Do not commence installation until all work above suspended ceiling has been completed, inspected and accepted.

.4 Ensure that work to be concealed by ceiling systems has been installed, tested, inspected, and approved before starting work.

.5 Lay out ceilings in accordance with reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown, install ceilings as directed by Consultant.

3.4 INSTALLATION - SUSPENSION SYSTEM

.1 Install suspension system rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated, and in accordance with ASTM C636, CISCA installation standards and any other applicable national or local code requirements. Make allowance for thermal and structural movement.

.2 Suspend ceilings directly from structural members and not from ducts, pipes, conduits.

.3 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.

.4 At light fixtures occurring on and in suspended ceilings, provide suspension hanger at each corner of fixture and at maximum 610 mm on centre around perimeter of fixture.

.5 Attach hangers to structure with inserts and hanger supports. Do not use powder activated fasteners.

.6 Support hangers for suspended ceiling grid independent of walls, columns, pipes and ducts.

.7 Space hangers for ceilings at maximum 1220 mm (48") on centre in both directions. Provide additional hangers as required.

.8 Locate hangers at not more than 150 mm (6") from ends of main tee members.

.9 Erect suspension systems at required heights and water tube, transit, or laser beam level to tolerance of 1:1200.

.10 Allowable tolerances: to ASTM C636.

.11 Design suspension systems for a maximum mid-span deflection not exceeding L/360.

.12 Install exposed tee members to pattern indicated. Securely attach hangers to main tee members.

.13 Exposed tees shall be as long as possible to minimize joints. Make joints square, tight, flush and reinforce with splines. Distribute joints to prevent clustering in one area.

.14 Space tee bars to suit ceiling panels and as detailed, and to accommodate lighting fixtures, diffusers and return grilles.

.15 Cooperate in the installation of ceiling systems, making adjustments where required to ensure that the lighting fixtures, supply diffusers, exhaust grilles and other built-in items properly fit into ceiling module and finish flush with rest of ceiling.

.16 Restrict creep inside module panels so that in all cases strips are centred on module lines.

.17 Install perimeter shadow moulding where ceiling abuts vertical surfaces and abuts adjacent gypsum board ceiling system. Mitre all corners, use maximum lengths to minimize joints. Make joints square, tight and flush.

.18 Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing mouldings.

.19 Screw attach mouldings to substrates at intervals not more than 400 mm (16") on centre and not more than 210 mm (8") from ends, levelling with suspension system to tolerance of 3 mm in 3660 mm (1/8" in 12'-0"). Mitre corners accurately and connect securely.

.20 Provide perimeter shadow wall mouldings and cross tees at radiant heating panels mounted in both acoustic and gypsum board ceilings, as required to support heating panels (full perimeter). Provide cross tees at joints, splices, intermediate supports and access panels in radiant heating panels. Design system to adequately support radiant heating units. Coordinate with Mechanical Division.

.21 Provide metal edge trim at perimeter of floating acoustic ceiling system at required locations, as detail. Provide concealed connections to suspension system and prefabricated covers.

3.5 ROLL DOWN BLINDS (ROLLER WINDOW SHADES)

.1 Install mounting brackets for blinds head assembly supplied by Section 12 21 16 - Roller Shades where blinds are to be recessed into ceiling assembly. Securely fasten to supporting substrate, at maximum 1500 mm spacing and at ends of each blind unit.

.2 Supply and install clear anodized extruded aluminum ceiling trim at recessed roll down blinds head assembly, continuous full length of blinds and window opening. Securely fasten trim to blind mounting brackets.

.3 Coordinate installation of roll down blind mounting brackets and ceiling trim with Section 09 21 16 - Gypsum Board Assemblies. Install brackets and trim level, flush with adjacent ceiling. Ceiling framing system not to be fastened to or supported on blind brackets and trim.

3.6 INSTALLATION - TILES

.1 Take precautions during installation to ensure tile edges are not chipped or otherwise damaged.

.2 Install acoustical tiles to form horizontal and level ceiling with all parts flush and joints butted tightly to hairline appearance.

.3 Distribute variations in colour and texture of panels to obtain a uniform appearance.

.4 Minimize field cutting. Where necessary, match factory cut edge and colour.

.5 Install tiles so that work is clean and unmarked.

.6 Neatly cut and fit tiles as required to suit ceiling layout and to accommodate other work.

.7 Recessed items shall replace or be centred on tile unless otherwise indicated.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00 – Joint Sealants.

.2 Section 09 05 00 - Product and Finish Key.

.3 Section 09 67 23 – Epoxy Flooring.

.4 Section 09 30 13 – Tiling.

.5 Section 09 68 00 – Carpeting.

.6 Schedules and Legends on Drawings

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM F1303-04(2009), Standard Specification for Sheet Vinyl Floor Covering with Backing

.2 ASTM F1860-10, Standard Specification for Rubber Sheet Floor Covering With Backing

.3 ASTM F1861-08, Standard Specification for Resilient Wall Base

.4 ASTM F2034-08, Standard Specification for Sheet Linoleum Floor Covering

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data sheets.

.3 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base, nosing, feature strips, treads, edge strips.

.4 Closeout Submittals:

.1 Provide maintenance data for resilient flooring for incorporation into Operation and Maintenance Manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Manufacturer’s written requirements.

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Waste Management Plan.

1.5 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide extra materials: 5 m^2 of each colour, pattern and type flooring material required for project for maintenance use.

.2 Extra materials one piece and from same production run as installed materials.

.3 Identify each roll of sheet flooring and each container of adhesive.

.4 Deliver to Place of Work at one week prior to Substantial Completion.

1.7 WARRANTIES

.1 Contractor shall correct any deficiencies of labour or material found in the work performed for a period of 2-years from date of Substantial Performance.

.2 Provide manufacturers' warranties as specified in article 2.1 MATERIALS.

Part 2 Products

2.1 MATERIALS

.1 Materials:

.1 Refer to Section 09 05 00 - Product and Finish Key.

.2 as Scheduled, or as otherwise selected by Consultant; Refer to legends on Drawings.

.2 General Criteria – Meet or Exceed the Following as Applicable:

.1 Laminate Flooring:
- .1 Laminate vinyl flooring, to ASTM F1700 and EN 13329.
- .2 Overall thickness: 12 mm (nominal).
- .3 Pattern, texture, colour: as indicated on Drawings, or selected by Consultant from manufacturer's full range.
- .4 Warranty: 50-Year Residential Warranty.

.2 Vinyl Sheet Flooring:
- .1 Sheet vinyl with backing: to ASTM F1303. Type I, Grade 1, Class A Backing.
- .2 Pattern: smooth.
- .3 Texture: printed to simulate tile, or as otherwise selected by Consultant from manufacturer's full range.
- .4 Colour: as indicated on Drawings, or selected by Consultant from manufacturer's full range.
- .5 Thickness: 2.0 mm (0.55 thick wear layer).
- .6 Warranty: Lifetime Limited Residential Warranty.

.3 Linoleum Flooring:
- .1 Linoleum sheet flooring: composed of natural ingredients that are mixed and calendered onto a jute backing: to ASTM F2034, Type 1, Class 23.
- .2 Width: 2 meters.
- .3 Thickness: 2.5 mm.
- .4 Patterns & Colours: as indicated on Drawings, or selected by Consultant from manufacturer's full range.
- .5 Warranty: 15-Year Residential Warranty.

.3 Resilient base to ASTM F1861-08, Type TS, Group 1 (solid) Standard Specification for Resilient Wall Base: continuous, top set, complete with pre-moulded end stops and external corners:

.1 Type: TS - Thermoset Vulcanized Rubber.

.2 Group: 1 - solid.

.3 Style: B – Cove, at tile or resilient flooring locations; A – Straight, at carpet locations.

.4 End Stops and External Corners: pre-moulded.

.5 Colour: as indicated on Drawings, or otherwise selected by Consultant from manufacturer's full range.

.4 Metal edge strips: extruded aluminum, smooth, anodized.

.5 Cap Strips: extruded aluminum, smooth, anodized, with lip to extend under coved floor finish and profile to cover top of coved sheet flooring.

.6 Cove Support Strip:

.1 Pre-Fabricated Cove Base: fabricated from same materials and dye lots as resilient flooring, in maximum practical lengths, with 38 mm x 38 mm formed aluminum reinforcing bonded to back of base material.

.1 Riser: 102 mm.

.2 Toe: 85 mm.

.3 Acceptable Manufacturers:

.1 FlashCove Prefabricated Bases Inc.

.7 External corner protectors: stainless steel, type recommended by flooring manufacturer.

.8 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.

.9 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.

.10 Welding rod: designed to weld seams of sheet flooring, as recommended by flooring manufacturer, colour as directed by Consultant.

.11 Sealers and waxes: types recommended by resilient flooring material manufacturer for material type and location.

.12 Block Wall Filler: Latex filler, S-180, by Armstrong Cork Canada Ltd., or Planicrete 20, by Mapei Canada Ltd., 87 Latex Underlayment, by Flextile Ltd. or waterproof filler recommended by flooring manufacturer.

.13 Sealant: clear silicone, as manufactured by Tremco, CGE, or Dow Corning.

.14 Profiles and transition strips: refer to Drawings.

.15 Rubber Wheelchair Transition Strip: Supply and install resilient transitions between dissimilar floor finishes, designed for wheeled traffic, by Johnsonite® or similar with same or better physical properties, in profiles and colours as directed by Consultant.

.16 Tactile Attention Indicators: to Section 10 01 00 - Miscellaneous Specialties; install where indicated and/or required by OBC.

.17 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written installation instructions, data sheets and standard details.

3.2 SITE VERIFICATION OF CONDITIONS

.1 Ensure concrete floors have maximum 2.5% moisture content, exhibit normal alkalinity and no carbonization or dusting.

.2 Ensure concrete floors are clean, smooth, and flat to flooring manufacturer's requirements and technical datasheets.

3.3 PREPARATION

.1 Prepare substrates according to manufacturer's printed instructions as required to meet warranty requirements.

.1 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

.2 Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

.3 Mechanically remove contamination on the substrate that may cause damage to the resilient athletic flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.

.4 Prepare Substrates according to ASTM F710 including the following:

.1 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

.2 Perform anhydrous calcium chloride test, ASTM F1869. Results shall not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24 hours.

- or -

Perform relative humidity test using in situ probes, ASTM F2170. Shall not exceed 80%.

.3 A pH test for alkalinity shall be conducted. Results shall range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation shall not proceed until the problem has been corrected.

.4 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

.2 Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement-based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

.3 Floor covering shall not be installed over expansion joints.

.4 Do not install resilient products until they are same temperature as the space where they are to be installed.

.5 Move resilient products and installation materials into spaces where they will be installed at least 48-hours in advance of installation.

.6 Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

.7 At floor slabs to receive sheet flooring, provide cementitious underlayment over entire floor area to provide a level and flat floor finish. Refer to Section 03 35 00 - Concrete Finishing for materials.

3.4 INSTALLATION: GENERAL

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Cut flooring around fixed objects.

.4 Install feature strips and floor markings where indicated. Fit joints tightly.

.5 Install flooring in pan type floor access covers. Maintain floor pattern.

.6 Continue flooring over areas which will be under built-in furniture.

.7 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.

.8 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.9 Install wheelchair transition strips at unprotected or exposed edges where flooring terminates.

3.5 INSTALLATION: FLOOR TILE

.1 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.

.2 Install flooring to square grid pattern with joints aligned to ashlar/staggered pattern with continuous joints flowing with direction of mottle.

.3 As installation progresses and after installation is complete, roll resilient tile flooring in accordance with manufacturer’s instructions.

.4 Lay flooring with seams parallel to building line or as indicated on drawings to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.5 Run sheets in direction of traffic, double cut sheet joints, and heat weld according to manufacturer's printed instructions.

.6 Provide seams in accordance with manufacturer's recommendations. Heat weld seams with welding rod when heat welded seams are a permitted option by manufacturer.

.7 As installation progresses and after installation is complete, roll resilient sheet flooring in accordance with manufacturer’s instructions

3.6 INSTALLATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.

.7 Cope internal corners. Use pre-moulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

.9 Install toeless type base before installation of carpet on floors.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.7 INSTALLATION: ACCESSORIES

.1 Install feature strips and floor markings where indicated. Fit joints tightly.

.2 Install metal edge strips at unprotected and exposed edges where flooring terminates.

.3 Install cove support strips continuously where sheet flooring is to be coved to vertical surfaces.

.4 Install cap strips continuously to cover top edge of coved sheet flooring. Mitre corners. Top of cap strip shall be straight and level to variation of plus or minus 3 mm over 3 m straight edge.

.5 At junction of resilient flooring with other floor finishes and exposed concrete floors, supply and install wheelchair transition strips, type to suit flooring thickness and to provide a level transition.

3.8 INSTALLATION: SHEET FLOORING

.1 General:

.1 Carefully check flooring material for any defects.

.2 Contact your supplier immediately if any defect is found.

.3 Flooring and adhesive must be stored in an indoor climate controlled space and be protected from the elements. Temperature must be maintained between 65°F and 85°F (18.3°C and 29.4°C) with a relative humidity 40% and 60%

.4 Flooring must be acclimated at room temperature between 65°F and 85°F (18.3°C and 29.4°C) for 48 hours before, during and after the installation.

.5 Exposure to direct sunlight can result in products fading and creates excessive heat directly on the finished flooring and surrounding structure, which may result

in movement. During peak sunlight exposure, the use of drapes or other window treatments are recommended.

.6 Rolls must be stored horizontally on smooth surface supporting the entire width of the roll at all times prior to the installation.

.7 Flooring must be rolled on a sturdy core, design in or design out, when transporting to the jobsite.

.8 Protect rolls from damage.

.9 Remove all transitions, quarter round, baseboard molding or cove base prior to beginning the installation.

.10 Provide an approved underlayment for use with specified flooring for above and below grade applications. Refer to manufacturer instructions.

.11 Provide an approved adhesive system for use with specified flooring for above and below grade applications. Refer to manufacturer instructions.

.2 Installation - Wood Substrate:

.1 Wood joist or truss systems spacing must be a maximum of 16” on center when installing over single layer wood construction.

.2 Wood joist or truss systems spacing of 16”-19.2” is acceptable for double layer wood construction.

.3 Subfloor panels must be dry, sturdy, smooth, dimensionally stable and structurally sound.

.4 Subfloor panels must be 3/4” minimum thickness tongue and groove plywood or oriented strand board (OSB).

.5 Plywood subfloor panels must consist of a solid core (no voids).

.6 Subfloor panels must be exterior grade or classified as Exposure I.

.7 All suspended wood subfloors must have at least 18” of well-ventilated air space clearance above the ground. The ground under the crawlspace shall be covered with 10 mil or thicker polyethylene sheeting to reduce moisture vapor transmission.

.8 Offset subfloor panel joints by at least 16” so that four corners do not meet.

.9 Subfloor panels must be securely fastened to the joists and free from spring or deflection. If glue-nail procedures are required, use solvent free construction adhesives.

.3 Installation - Concrete Substrate:

.1 Flooring may be installed over properly constructed and prepared on-grade, above-grade or below-grade concrete subfloors.

.2 Concrete subfloors must be constructed as recommended by the American Concrete Institute’s ACI 302.2 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

.3 Prepare concrete subfloors according to ASTM F710 Standard Practice for Preparation of Concrete Floors to Receive Resilient Flooring. The surface of the concrete must be dry, clean, smooth, and structurally sound. The slab must be swept, damp mopped and/or vacuumed to remove any dust. Any surface materials present such as loose paint, wax, grease, oil, adhesive residues, crayon, pen marking, etc., that may prevent a proper adhesion or migrate to the surface of the flooring causing discoloration, must be removed. Fill and level any cracks, construction joints, control joints, depressions, grooves or other irregularities with a high quality, non-shrinking, latex-fortified, cementitious patching compound. For substrates with high moisture content, contact the major patching compounds manufactured for detailed installation instructions.

.4 Do not install flooring over expansion joints, or other moving joints in the substrate. These joints must be respected and should not be filled with products that are not intended for that purpose. Contact an expansion joint cover manufacturer to meet specific flooring conditions.

.5 Moisture testing of concrete subfloors must be performed in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride and ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. Coordinate flooring installation requirements with manufacturers instructions. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.

.6 Contractor is responsible for remediating high moisture in concrete substrates. Coordinate with structural drawings and specifications. Several companies manufacture products suitable for moisture remediation. We suggest you refer to the current ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring and ASTM F 3010 Standard Practice for Two Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Flooring Systems.

.7 pH testing of concrete subfloors must be performed in accordance with ASTM F710 Standard Practice for Preparing Concrete Floors to receive Resilient Flooring. Coordinate flooring installation requirements with manufacturers instructions.

3.9 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

3.11 PROTECTION

.1 Protect installed products and components from damage during construction. Prohibit traffic on floor for 48 hours after installation.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Apply paint as required and as indicated; refer to Drawings, Legends and Schedules. Coordinate with other Trades and sequence Work of this Section in relation to other Work as directed by Contractor.

.2 Legends on Drawings.

.3 Section 09 05 00 - Product and Finish Key.

1.2 REFERENCES

.1 ASTM International (ASTM):

.1 ASTM D16-12, Standard Terminology for Paint, Related Coatings, Materials, and Applications.

.2 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Green Seal:

.1 Green Seal Standards GS-11, Paint.

.2 Green Seal Standard GC-03, Anti-Corrosive Paints.

.3 Department of Justice Canada (Jus):

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.4 Master Painters Institute (MPI):

.1 MPI Architectural Painting Specifications Manual.

.5 National Fire Code of Canada – 2015.

.6 Society for Protective Coatings (SSPC):

.1 SSPC Painting Manual, 2011 Edition.

.7 Environmental Protection Agency (EPA):

.1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

.8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Construction Progress Schedule.

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building trades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Scheduling:

.1 Submit work schedule for various stages of painting to Consultant for review. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Consultant for changes in work schedule.

.3 Schedule painting operations to prevent disruption of and by other trades.

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Health and Safety Requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit product data and instructions for each paint and coating product to be used.

.2 Submit product data for the use and application of paint thinner.

.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.

.2 Submit samples in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit full range colour sample chips to indicate where colour availability is restricted.

.2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating, and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:

.1 3 mm plate steel for finishes over metal surfaces.

.2 13 mm birch plywood for finishes over wood surfaces.

.3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.

.4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.

.5 10 mm plywood for finishes over wood surfaces.

.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.3 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, and include following information for each Product and colour incorporated into the Work:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour number / formula code.

.4 MPI Environmentally Friendly classification system rating.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation and application instructions.

.5 Submit quality assurance submittals in accordance with Section 01 45 00 - Quality Control.

.1 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.1 Lead, cadmium and chromium: presence of and amounts.

.2 Mercury: presence of and amounts.

.3 Organochlorines and PCBs: presence of and amounts.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

.1 Provide 3 m x 3 m mock-up. Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures.

.2 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.

.3 Locate where directed.

.4 Allow 24 hours for review of mock-up before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.3 Store materials and equipment in well-ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces.

.2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.3 Provide continuous ventilation for seven days after completion of application of paint.

.4 Coordinate use of existing ventilation system with Consultant and ensure its operation during and after application of paint as required.

.5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.6 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by Consultant and product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is above 85% or when the dew point is more than 3 degrees C variance between the air/surface temperatures. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 12% for concrete and masonry (clay and concrete brick/block).

.2 15% for wood.

.3 12% for plaster and gypsum board.

.4 Allow new concrete and masonry to cure minimum of 28 days.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

.5 Additional exterior application requirements:

.1 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.2 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.3 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.4 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.5 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

1.8 EXTENT OF WORK

.1 Paint and finish "paintable" surfaces for area of the Work indicated in the Contract Documents, except those exempted by the Contract Documents.

.2 The following surfaces are considered "non-paintable" for purposes of this Contract.

.3 Omit painter's finishes from following items:

.1 Material and equipment furnished completely prime and finish painted by manufacturer.

.2 Internal surfaces of steel tanks and stacks;

.3 Intumescent fireproofing (unless otherwise specified or indicated).

.4 Exterior concrete including building walls, building floors and pavements, except as otherwise scheduled.

.5 Stainless steel, weathering steel, copper, bronze, chromium plate, nickel, anodized or lacquered aluminum, Monel metal (alloy composed of between 28 and 34 percent copper and minimum 63 percent nickel).

.6 Exposed insulation, glass, plastic, brick, stone, resilient floors, treads and bases, tile and hardware.

.7 Prefinished metals, unless required to be colour coded.

.8 Metallic and mastic insulation finishes.

.9 Abrasive material finishes on floors, stair treads, stair nosings and landings.

.10 Insulated electric cables.

.11 Machined parts of machinery and equipment.
.12 Concealed surfaces (except visible portions of inside of ductwork and louvres, etc.).

1.9 EXTRA MATERIALS

.1 Provide two sealed containers, each of four litres (one gallon) capacity of each paint product in each colour used in the work for Owner's maintenance use. Containers shall be new, clearly labelled with manufacturer's name, type of paint, colour and colour number. Store at the Place of the Work where directed by Owner.

1.10 WARRANTY

.1 Warranty period with regard to the work of this section is 2 years from date of Substantial Performance.

.2 Throughout the warranty period, painting systems shall remain free from failure due to causes including: material failure; surface preparation less than that specified; and paint film thickness less than that specified, or when not specified, less than that coverage recommended by manufacturer.

.3 Presence of any defects during the warranty period shall constitute failure: visible corrosion; film peeling, blistering, checking, scaling, embrittling or general film disintegration; and poor adhesion as determined by tape "peel-off" test procedures.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer throughout unless approved by the Consultant.

.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.

.4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.

.5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

.6 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:

.1 Use water-based coatings where available.
.2 Non-flammable.
.3 Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
.4 Manufactured without compounds that contribute to smog in the lower atmosphere.
.5 Do not contain methylene chloride, chlorinated hydrocarbons, or toxic metal pigments.

.7 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.8 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.9 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:

.1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.

.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

.3 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.

.10 Surface coatings must not contain:

.1 Lead in excess of 600.0 ppm weight/weight total solids.

.2 Mercury in excess of 50.0 ppm weight/weight total product.

.3 Cadmium in excess of 1.0 ppm weight/weight total product.

.4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.

.5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.2 COLOURS

.1 Coordinate with Section 09 05 00 - Product and Finish Key.

.2 Schedules for finish and colour: Refer to legends on Drawings. Allow for 10 field colours and 10 accent colours; final selections and exact locations determined by Consultant.

.3 Second coat and third-coat in a multicoat system are to be tinted slightly lighter colour than top coat and each other to show visible difference between coats.

2.3 FINISHES

.1 Paint colours and other finishes will be selected by Consultant. Do not start work until after receiving colour schedule.

.2 Colours selected by Consultant will not necessarily be from manufacturer's standard colours.

.3 A variety of colours may be used. Consultant may select different colours for different elements. Some colours may be deep tones.

.4 Confirm gloss levels for all surfaces with Consultant before starting work. Unless otherwise indicated, allow for:

.1 Ceilings: flat.

.2 Walls: flat or eggshell (semi-gloss at service areas).

.3 Trim/frames: semi-gloss.

.4 Existing or proposed exposed roof deck, and roof structural elements, mechanical equipment, ducts, piping which is exposed in all areas as directed by Consultant:

.1 Flat, dryfall paint, Consultant to provide colours.

.2 Identification labelling by Division 22 and 23.

2.4 MIXING AND TINTING

.1 Unless otherwise specified or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in contained prior to and during application to ensure break-up of lumps, completed dispersion of settled pigment, and colour and gloss uniformity.

.2 Mix paste, powder, or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

2.5 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Description / Gloss Level	Gloss @ 60 degrees	Sheen @ 85 degrees
G1 - Matte/Flat Finish	Max. 5	Max. 10
G2 - Velvet-Like Finish	Max. 10	10 to 35
G3 - Eggshell Finish	10 to 25	10 to 35
G4 - Satin Finish	20 to 35	min. 35
G5 - Traditional Semi-Gloss Finish	35 to 70	
G6 - Traditional Gloss	70 to 85	
G7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated or otherwise specified.

2.6 EXTERIOR PAINTING

.1 All exterior painting work to be in accordance with MPI Premium Grade finish requirements, minimum 1 coat of primer, 2 intermediate coats, and finish coat. Refer to Schedules for instructions.

.2 Asphalt Surfaces: zone / traffic marking for drive and parking areas, etc.

.1 EXT 2.1B - Alkyd zone / traffic marking finish.

.3 Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal:

.1 All structural steel, metal fabrications, railings, etc., at building enclosure, whether exposed or within exterior wall assembly, and all exposed steel elements, shall be hop dip galvanized after fabrication and then painted:

.1 Galvanizing: hot-dip method with minimum zinc coating of 705 g/m^2 conforming to ASTM A123 for fabricated assemblies. ASTM A153/A153M for all hardware (average zinc coating of 381 g/m^2). Hot dip galvanize after fabrication.

.2 Touch-up galvanized surfaces with zinc rich coating, to ASTM A780: DOD-P-21035 zinc rich paint, minimum DFT 8 mils.

.3 EXT 5.1P - Polyurethane, pigmented finish (over epoxy zinc rich primer).

.4 Steel - High Heat: heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted:

.1 EXT 5.2A – Heat-resistant enamel finish, maximum degrees C.

.5 Galvanized Metal: non-chromate passivated; high contact/high traffic areas (doors, frames, railings and handrails, etc.):

.1 EXT 5.3D – Polyurethane, pigmented finish (over vinyl wash and epoxy primer).

.6 Bituminous Coated Surfaces: cast iron pipe, concrete, etc.:

.1 EXT 10.2A – Latex semi-gloss finish.

2.7 INTERIOR PAINTING

.1 All interior painting work to be in accordance with MPI Premium Grade finish requirements, minimum 1 coat of primer, 2 intermediate coats, and finish coat. Refer to schedules on Drawings to coordinate locations and determine finishes required.

.2 Structural, electrical and mechanical elements at exposed areas, including visible inside portions of ductwork and louvres, shall be primed and finish-painted to MPI Premium Grade requirements.

.1 Basis-of-design:

.1 INT 5.1R High performance architectural latex.

.2 Gloss: Semi-gloss.

.3 Wood; Painted finish, INT 6.4S:

.1 1st Coat: Enamel Undercoat.

.2 2nd Coat: Acrylic latex enamel.

.3 3rd Coat: Acrylic latex enamel.

.4 Gloss: Semi-Gloss.

.4 Wood; Stained and varnished (transparent finish); Semi-transparent stain Polyurethane varnish (single component) finish, INT 6.4V:

.1 1st Coat: Wood Filler.

.2 2nd Coat: Stain.

.3 3rd Coat: Polyurethane (reduced).

.4 4th Coat: Polyurethane.

.5 5th Coat: Polyurethane.

.6 Gloss: Satin.

.5 Wood; Clear Polyurethane varnish (single component) finish (transparent finish), INT 6.4J:

.1 1st Coat: Wood Filler.

.2 2nd Coat: Polyurethane (reduced)

.3 3rd Coat: Polyurethane.

.4 4th Coat: Polyurethane.

.5 Gloss: Satin.

.6 High-Humidity Areas (natatorium, tub rooms, and other wet areas that normally develop higher relative humidity):

.1 Gloss: matte.

.2 Basis-of-Design:

.1 Benjamin Moore, Aura Bath & Spa.

.7 Doors, Frames, Trim:

.1 Gloss: semi-gloss.

.2 Basis-of-Design:

.1 Benjamin Moore, Advance

.8 Gypsum Board; walls and partitions:

.1 Latex finish, INT 9.2B:

.1 1st Coat: Latex Primer Sealer.

.2 2nd Coat: Acrylic latex.

.3 3rd Coat: Acrylic latex.

.4 Gloss:

.1 Typical walls: Matte.

.2 Wet and Service Areas; walls and ceilings: Eggshell.

.9 Gypsum Board; ceilings and bulkheads:

.1 Latex finish, INT 9.2B:

.1 1st Coat: Latex Primer Sealer.

.2 2nd Coat: Acrylic latex.

.3 3rd Coat: Acrylic latex.

.4 Gloss:

.1 Typical ceilings: Flat.

.2 Wet and Service Areas; walls and ceilings: Semi-Gloss.

.10 High Performance Epoxy Coating System (Over Masonry or Gypsum Board):

.1 Basis-of-Design: FloroWall Sanitary Epoxy Wall Coating System, by Florock®, or similar to same effect meeting or exceeding the specified product in physical properties and performance characteristics and tested for resistance to the same chemical exposures.

.1 Provide manufacturer’s recommended primer and top coats as required for a complete application.

.2 Sward Hardness, to ASTM 2240: 70.

.3 Abrasion Resistance, Taber Abrader CS-17 Wheel, 1000 gm load, 1000 cycles, to ASTM D4060: 67 mg loss.

.4 Impact Without Fiberglass – Forward, to ASTM G14: Passes, 25 inch-pounds.

.5 Elongation to ASTM D2370: 5%.

.6 Shore Hardness, A/D, to ASTM D2240: 100/75.

.11 Exposed piping and ductwork, wrapped; Latex finish, INT 5.3M or 5.1R as applicable:

.1 1st coat latex primer sealer.

.2 2nd coat acrylic latex.

.3 3rd coat acrylic latex.

.4 Gloss: Semi-gloss.

.12 Concrete masonry and all exposed concrete ceilings:

.1 Latex Paint:

.1 INT 4.2D High-performance architectural latex.

.2 Gloss: satin.

.3 Basis-of-Design:

.1 Benjamin Moore, Ultra Spec Masonry Acrylic Latex Satin.

.2 Epoxy Paint:

.1 Refer to 2.7(.10) above.

.13 Concrete; Painted, INT 3.1C:

.1 Latex Enamel:

.1 1st Coat: Latex Primer Sealer.

.2 2nd Coat: Acrylic latex enamel.

.3 3rd Coat: Acrylic latex enamel.

.4 Gloss: Eggshell.

.2 Epoxy Paint:

.1 Epoxy Finish: INT 4.2S Epoxy.

.2 High-build gloss finish (over epoxy high-build gloss).

.14 Epoxy sealed concrete floors (non-slip): commercial-quality pigmented two-component, solvent-free and low-VOC containing, epoxy binder and coating, having the following minimum physical properties:

.1 Refer to specification section 09 67 23 - Epoxy Flooring.

.15 Painted concrete floors; Floor enamel, INT 3.2A:

.1 1st Coat: Floor Enamel (reduced).

.2 2nd Coat: Floor Enamel.

.16 Sealed concrete floors:

.1 1st Coat: Acrylic based waterborne curing and sealing compound.

.2 2nd Coat: Acrylic based waterborne curing and sealing compound.

.3 Acceptable Product: 'Vocomp 30' by W.R. Meadows.

.17 Metal and prime painted structural steel and steel fabrications; Latex finish INT 5.1R:

.1 1st Coat: Latex Metal Primer.

.2 2nd Coat: Acrylic Latex Enamel.

.3 3rd Coat: Acrylic Latex Enamel.

.4 Gloss: Semi-Gloss.

.18 Galvanized metal (zinc coated steel), including exposed piping and conduit unwrapped:

.1 Alkyd finish, INT 5.3M High-performance architectural latex.

.1 1st Coat: Galvanized metal primer.

.2 2nd Coat: Acrylic latex finish.

.3 3rd Coat: Acrylic latex finish.

.4 Gloss: Semi-Gloss.

.2 Repainting: RIN 5.3J – High performance architectural latex.

.19 Bituminous coated surfaces: cast iron pipe, concrete, etc.:

.1 INT 10.2A - Latex G5 finish.

.20 Fire Retardant Paint (electrical and communications plywood panels):

.1 Standard of Acceptance:

.1 Fire Retardant Paint FR-110, by Incl-x, or similar from Great Northern Insulation, InnovProtect, or AD Fire Protection Systems.

.2 Colour: white.

.3 CSA Class A - flame spread rating 0 - 25.

2.8 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.

.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.

.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

Part 3 Execution

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

.1 Perform preparation and operations for interior and exterior painting in accordance with MPI - Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

.1 Stucco, plaster, and gypsum board: 12%.

.2 Concrete: 12%.

.3 Wood: 15%.

.4 Clay and Concrete Block/Brick: 12%.

.4 Check surfaces to determine if pH of surfaces meet manufacturer's requirements.

.5 Inspect surfaces to be coated for gouges, marks, nibs, and other defects and properly prepare patching, filling, smoothing or other surface preparation necessary to ensure satisfactory finish.

.6 Report in writing any condition adversely affecting this work.

.7 Proceed with work only when surfaces and conditions are satisfactory. Remove dust, grease, rust, scale and extraneous matter, tool and machine marks and insects from all surfaces which could be detrimental to a satisfactory and acceptable finish.

3.4 PREPARATION

.1 Prepare substrate surfaces in accordance with MPI Manual Premium Grade requirements including, but not limited to remaining items listed in this article.

.2 Remove hardware and hardware accessories, electric plates, machined surfaces, lighting fixtures, other escutcheons and appurtenances and similar items already installed that are not to be painted:

.1 Provide surface applied protection before surface preparation and painting where removal is impractical or impossible because of size or weight of the item.

.2 Reinstall items removed using workers skilled in the trades involved after completing painting operations in each space or area.

.3 Remove oil and grease then clean substrates of substances that could impair bond of the various coatings before applying paint or other surface treatments:

.1 Clean floors, adjacent surfaces and surfaces to be painted before work is commenced.

.2 Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

.3 Clean and prepare surfaces according to manufacturer's written instructions for each particular substrate condition and as specified.

.4 Prepare concrete floors to CSA A23.1/A23.2.

.4 Provide barrier coats over incompatible primers or remove and re prime substrate where trade contractor for this Section failed to adequately coordinate use of MPI Manual recommended primers and surface preparation techniques.

.5 Prepare concrete, concrete unit masonry by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents; roughen as required to remove glaze; mechanically remove hardeners or sealers used to improve curing; use solvent or mechanical cleaning methods that comply with SSPC recommendations appropriate to surface and exposure location:

.1 Exposed concrete and concrete block walls that are scheduled to be painted or sealed shall not be painted or sealed until sealants have been applied at control joints and joints with hollow metal frames.

.2 Thoroughly clean form oil, parting compounds, curing compounds and other incompatible materials from concrete surfaces.

.3 Thoroughly clean masonry and concrete surfaces to be painted free of mortar droppings, concrete spatter and extraneous matter.

.4 Use abrasive blast cleaning methods if recommended by paint manufacturer.

.5 Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application.

.6 Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

.7 Clean concrete floors with a 5% solution of muriatic acid or other etching cleaner; flush floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

.6 Clean wood surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required and as follows:

.1 Sand surfaces exposed to view smooth and dust off before prime coat application. Putty nail holes and minimal cracks after primer has dried; sand between primer and top coats with No. 300 sandpaper and remove dust.

.2 Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer.

.3 After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler, sand smooth when dried.

.4 Where wood elements are to be painted, stained or clear finished:

.1 Prime, stain, or seal wood to be painted immediately on delivery.

.2 Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.

.3 Back prime with spar varnish where transparent finish is required.

.4 Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.

.7 Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances using solvent or mechanical cleaning methods that comply with SSPC recommendations appropriate to surface and exposure location:

.1 Clean unpainted and shop primed metal to provide satisfactory surfaces to receive overcoats and provide permanent adhesion of coatings. Remove rust and scale with emery paper and wire brushes. Thoroughly clean metal surfaces including piping and ductwork of oil and grease with mineral spirits.

.2 Remove loose paint and scale from shop primed metal work.

.3 Blast steel surfaces clean as recommended by paint system manufacturer.

.4 Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

.5 Prime bare metal, make good shop primed metal where abraded, feather out edges to make touch-up patches inconspicuous.

.6 Touch up bare areas and shop applied prime coats that have been damaged; wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as shop coat.

.8 Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants, mechanically remove pre-treatment materials from galvanized sheet metal fabricated from coil stock.

.1 Apply cold phosphate surface treatment to SSPC-PT2-82 to unpassivated zinc-coated metal.

.2 For passivated zinc-coated metal ("white rusted"), power wire brush or vigorously hand wire brush to scuff galvanize thoroughly, and solvent clean to SSPC-SP1-82.

.3 Prepare exterior exposed galvanized steel and galvanized steel at wet areas to SSPC-SP7 - Sweep Blast.

.4 For galvanized steel floor and roof deck in Natatorium and related adjacent service areas, supplement the above in accordance with Paragraph 3.9 of this section and finish coating system manufacturer's instructions and recommendations.

.9 Gypsum Board:

.1 Ensure that gypsum board joints are smooth and board is clean and free of jointing compound spatter.

.2 Test surfaces for alkalinity with pink litmus paper or other recognized method.

.10 Mix and prepare paint materials according to manufacturer's written instructions:

.1 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

.2 Stir material before application to produce a mixture of uniform density.

.3 Stir as required during application to maintain consistent tint density.

.4 Do not stir surface film into material, remove surface film and strain material before using.

.5 Use only thinners approved by paint manufacturer and only within recommended limits.

.6 Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied.

.7 Tint undercoats to match the colour of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

.11 Shut down motors, fans, and mechanical ventilation systems during spray painting. Shut down air intakes in affected areas and ventilate to exterior, when applying noxious smelling or VOC containing paints and coatings.

.12 Materials shall be thoroughly mixed before application and applied without cutting or admixture except as indicated in writing by the manufacturer.

.13 Protect adjacent surfaces and areas from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means.

.14 Correct, refinish or replace any damage caused by failure to provide adequate protection to adjacent surfaces.

.15 Sand, clean, dry, etch, neutralize or test all surfaces using adequate illumination, ventilation and temperature requirements in accordance with manufacturer's written instructions and the MPI Manual.

.16 Keep waste rags in covered metal drums containing water and remove from building at end of each day.

3.5 APPLICATION - PRIMERS

.1 Completely prime all surfaces of exterior wood to receive paints or coatings.

.2 Apply primer coats to steel and galvanized steel surfaces that have and have not received shop coat or primer.

.3 Finish and back prime all wood components prior to their installation.

.4 When primer sealer is dry, touch up visible suction spots before the next coat is applied and do not proceed with the work until suction spots are sealed.

3.6 APPLICATION

.1 Method of application to be as approved by Consultant. Apply paint by brush, roller, air sprayer or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller type suitable for application.

.2 Work paint into cracks, crevices, and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers, or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers, or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags, brush marks from finished work, and repaint.

.3 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices, and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish inside of cupboards and cabinets as specified for outside surfaces.

.10 Finish closets and alcoves as specified for adjoining rooms.

.11 Finish top, bottom, edges, and cut-outs of doors after fitting as specified for door surfaces.

.12 Reseal cut edges of wood doors and seal unfinished tops and bottoms of wood doors with 3 coats polyurethane sealer. At wood doors with plastic laminate facing, paint edges of doors to match colour of plastic laminate, 1 coat of primer and 2 finish coats.

.13 Grilles and perforated items shall be spray painted in a manner that does not block perforations. Apply evenly to present a consistent appearance free from defects visible from distance of 1.5 metres.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Unless otherwise specified or noted, paint all “unfinished” conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and texture to match adjacent surfaces, in the following areas:

.1 where exposed-to-view in all exterior and interior areas.

.2 in all interior high humidity interior areas.

.3 in all boiler room, mechanical and electrical rooms.

.2 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.3 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.4 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.5 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.6 Do not paint over nameplates.

.7 Keep sprinkler heads free of paint.

.8 Paint inside of ductwork where and to the full extent visible behind grilles, registers, and diffusers with primer and minimum one coat of matt black paint.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

.13 Coordinate painting of services with application of colour banding, flow arrows, and identification labels provided by mechanical and electrical Divisions.

3.8 PATCHING

.1 Do retouching to ensure that the work is handed over to the Owner in proper condition, free of runs, spatter, finger marks, rust, watermarks, scratches, blemishes or other disfiguration, with full, even coverage.

3.9 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.10 FIELD QUALITY CONTROL

.1 Where special painting, coating or decorating system applications (e.g., elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Consultant.

.2 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Cooperate with inspection firm and provide access to areas of work.

.4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.1 Prevent overspray and/or splashes to adjacent surfaces.

.2 Clean spills, splashes and/or or overspray immediately using manufacturer's recommended cleaners and procedures.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.

3.12 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.13 SCHEDULES

.1 Finish Schedule: refer to schedules on Drawings and the requirements of this Section.

.1 Assume full responsibility for painting or otherwise finish surfaces of all materials of the contract exposed in the finished work which do not already have finished surfaces and that normally require paint or varnish finish. Inspect surfaces over which the work of this section is dependent for unevenness, cracks, surface defects, moisture, cleanliness, roughness and other irregularities detrimental to the application and performance of the work. Confirm conditions satisfactory before proceeding. Failure in complying with above or failure to have unsatisfactory conditions corrected before proceeding, shall not relieve Contractor of responsibility for required results.

.2 Exposed means visible in complete work including interiors of cupboards and closets, tops of doors, trim, and the like, whether in sight line or not, including behind surface mounted fixtures and heating units.

.3 Unless otherwise indicated, all exposed wood that is not prefinished is to receive a transparent finish. Prefinished wood items include:

.2 Plastic Laminate Faced Wood doors (except edges).

.1 Cabinet work.

.3 In instances where materials specified are not suitable for particular application or are contrary to manufacturer's recommendations for use on particular surface, immediately bring to attention of Consultant for clarification and instructions.

.4 Where finishing formula for surfaces requiring paint is not specified, follow recommendations of MPI Painting Specifications Manual, Premium.

.5 Consultant shall have right to make changes in colour tone of finishes prior to final coat to obtain desired results without additional cost to Owner.

.6 Unless otherwise noted or scheduled, walls shall be painted the same colour within a given area.

.7 Access doors, prime coated butts and other prime painted hardware, registers, radiators and covers, exposed piping and electrical panels shall be painted to match adjacent surfaces in terms of colour, texture and sheen, unless otherwise indicated.

.8 In areas specifically designated as "unfinished" painting is not required except for bare, primed and zinc coated metal surfaces and insulated ductwork and pipes.

.9 Where exposed to view paint bare metals, previously primed metals and zinc coated metals unless specified otherwise.

.10 Paint electrical power and lighting panels, whether prefinished or not.

.11 Unless specifically indicated on drawings to be painted, all finish carpentry work shall receive transparent finish.

END OF SECTION