



City of Waterloo

**Waterloo City Hall
2nd Floor Renovations**

TENDER SPECIFICATIONS

Winter 2025

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Each section of this Specification is numbered to conform to CSA/CSC MASTERFORMAT arranged in the 50 Division 6 digit Format.

The Sections are written as units of Work and have been assigned particular numbers. They are arranged in sequence for this particular Contract. Any gaps in the order of numerical sequence do not indicate that a Specification Section has been inadvertently omitted but, rather, that a Section is not included in the Specification for this Contract.

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DIVISION 00 SUBMISSION & REFERENCE DOCUMENTS

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| 000000 | List of Contents | 03 | Winter 2025 |
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The following portions of Division 00 shall be issued under separate cover:

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| 002000 | Existing Conditions and Reference Documentation | 03 | Winter 2025 |
| | Owner's Operations, Security, and Safety Conditions | 09 | Winter 2025 |
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DIVISION 01 GENERAL REQUIREMENTS

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| 017780 | Sample Warranty Form | 01 | Winter 2025 |
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Not used this project

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Not used this project

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Not used this project

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END OF SECTION

1. GENERAL

1.1. Related Sections

1. The Contractor shall thoroughly review all sections and divisions of the specification, and the drawings, to ensure that work of this section is understood together with all related items of the Contract.

Particular attention is drawn to the following:

1. Form of Agreement and General Conditions as modified by the Supplementary Conditions
 2. List of Documents, Section 008000
 3. All sections of Division 1
- 2.1. Thorough investigation of existing conditions through examination of the Project Site, Place of the Work, areas which are affected by the Work, examination of documentation made available by the Owner for inspection, and requirements of authorities having jurisdiction for the Project Site and Work, is the sole responsibility of the Bidder.
- 3.1. Attendance at the Bidder's Site Meeting is not mandatory for the Bidder. Notwithstanding, the act of submitting a Bid is an acknowledgement that the Bidder has examined all relevant areas of the Project Site, Place of the Work, available documentation and/or reports, and requirements of authorities having jurisdiction over the Project Site and the Work, and that the Bid incorporates all items which can be reasonably inferred from such examination.

2. OWNER'S USE AND ENJOYMENT OF PROPERTY DURING CONTRACT TIME

- 2.1. The Owner's requirements for use and enjoyment of the property where the Work is being performed during the Contract Time, and the Owner's requirements for scheduling of specific portions of the Work in order to facilitate use and enjoyment of portions of the property during the Contract Time, as outlined on attached documentation referenced by this Section, and as shown on drawings for possible construction sequencing, constitute existing conditions of the Work that the Bidder must incorporate into the Bidder's design for the accomplishment of the Work, the Bid Price, and ways and means that the Contractor must use to accomplish the Work.
- 2.2. Any further clarification of the Owner's requirements for use and enjoyment noted or referenced in this Section are to be solicited and obtained by the Bidder during the bidding period for this Contract, and shall be incorporated by the Bidder in the ways and means proposed for the performance of the Work. The act of submitting an Offer constitutes acknowledgement by the Bidder that all such information relevant to the Contractor's proposed means and methods for performance of the Work has been solicited, received, and incorporated by the Bidder into the offered Price and Contract Time.
- 2.3. All life safety systems, including fire truck access, hydrants, and other systems on the Owner's property must be protected and remain functional throughout the construction period, except with special permission of the Owner for short periods required to make service connections. The Contractor shall provide temporary protection to all such systems to ensure no false alarms occur, that the systems are not damaged by work, and that suitable arrangements for tie-ins and testing of systems at Owner's convenience are made.
- 2.4. All work of this Contract must be undertaken and performed to conform to the requirements of the Owner's Operations, Safety and Security Conditions attached hereto following this specification section.

3. SUBSURFACE AND EXISTING CONDITIONS, REFERENCE DOCUMENTS

- 3.1. All information relating to existing conditions on the project property with respect to the Work must be obtained by the Bidder directly from personal inspection of the site and examination of the reference documents and information identified in this Section and Section 008000.
- 3.2. The Owner acknowledges that the Contractor's direct inspection of the site, existing conditions, and reference documentation cannot, by its nature, reveal all conditions that exist or can occur to affect the Work. Should such conditions be found to vary substantially from conditions anticipated by the Consultant in the design, or reasonably inferable by the Contractor from the design, examination of the reference documents and information, or its inspection of the Project site, Place of the Work and existing conditions, then changes in the design and construction of the Work will be made, with resulting changes to Contract Time and Contract Price in accordance with provisions for such changes.
- 3.3. The Contractor is responsible for thorough inspection of subsurface and existing conditions as Work proceeds, and notification of the Consultant when such conditions may vary from conditions anticipated by the design and the Contract Documents.

4. CLIMATIC DATA

- 4.1. Climatic data and meteorological information is obtainable from Environment and Climate Change Canada. Where the Contractor determines in the course of the preparation of its bid that climate may affect in any manner the ways and means for performance of the Work as proposed by the Contractor, it shall thoroughly examine the climatic data for the last 10 (ten) year period at Environment and Climate Change Canada reporting station nearest the Site, and incorporate all information reasonably inferable from such data into the Offer, Contract Price, Construction Schedule, and Contract Time.
- 4.2. No change to the Contract Price or Contract Schedule will be considered for the effect of climate or weather conditions unless such conditions can be reasonably determined by the Consultant to be at significant variance from the norms of the last 10 year period, and that such variance clearly affects portions of the Work and the Construction Schedule adversely.

5. HAZARDOUS SUBSTANCES, DANGEROUS GOODS AND/OR PROCESSES

- 5.1. The Owner and Consultant are not aware of the presence of any designated substances in locations that may affect the Work of this Contract, other than that which is outlined in the report which forms part of Reference Document for this contract. The Owner and Consultant are not aware of any subsurface contamination conditions in the area of the Work or other areas of the property that may be affected by the Work of this Contract. Neither the Owner nor the Consultant have made careful investigation of the property for the possible presence of such designated substances or hazardous materials in locations that may affect the Work, except as otherwise noted in the Documents and Reference Documents.
- 5.2. The Contractor is solely responsible for information regarding hazardous materials or designated substances reasonably inferred from careful inspection of the project Site, Place of the Work, and reference documentation made available for the Contractor's examination. In submitting a Bid, the Contractor acknowledges that all work required by the presence of materials whose presence is reasonably inferred from the examinations noted above is incorporated in the Bid Price, Contract Time, and Contract Schedule.
- 5.3. Prior to submitting a Bid for the Work, the Bidder shall investigate requirements for aspects of the work, including but not limited to: caulking; painting and finishing; adhering; use of materials which involve a curing process during their installation; heating; burning or welding; generation of noise, dust, or air- or liquid-borne by-products; use of solvents or volatile materials; or any other process,

material or Product likely to generate hazardous substances and shall incorporate into the offer all procedures for performance of these aspects of the Work required by authorities having jurisdiction, common knowledge and practice, the Documents, and/or reasonable inference.

- 4.1. The Contractor is to supply Products and perform work with diligent regard for the safety and protection of the work force, the Owner's staff, the Facility and Owner's property, and the public from methods, materials, Products, and substances noted above, in all locations of manufacture, delivery, installation and intended use. In submitting a Bid, the Bidder acknowledges that all work required by the presence of substances noted above and/or means of production or performance of the Work is incorporated in the Bid Price, Contract Time, and Contract Schedule.

6. RELATED INFORMATION

- 6.1. The Bidder shall thoroughly review reference portions of the Documents and Reference Documents described in Section 008000 which are intended to clarify the context for the Work.
- 6.2. In submitting a Bid the Bidder acknowledges that all work required to co-ordinate the Work in relation to the intended construction and in-service conditions reasonably inferred from the reference documents is incorporated in the Stipulated Lump Sum Price, Contract Time, and Contract Schedule.

END OF SECTION

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2nd Floor Building Renovations
Owner's Operations, Safety, and Security Conditions

These operations, safety, and security conditions (also referred to herein as "the Conditions") shall govern the means and methods by which the Contractor shall accomplish the Work. They are incorporated into the Contract as Existing Conditions as referenced in Section 002000 of the specification. They are in addition to Contract requirements stated elsewhere in the specifications, and are intended to complement them. In case of discrepancy, the Contractor shall incorporate the most stringent and costly requirement, at no further cost to Owner.

Discussion of Project:

The Work is the renovation of an existing 2nd Floor of Waterloo City Hall located 100 Regina Street South, Waterloo, Ontario. Waterloo City Hall shall be continuously occupied and functional throughout the construction period. The Work involves renovations of the interior, all as set out in the Documents.

It is a requirement that the 2nd floor renovation is completed in an expeditious manner to meet Contract Schedule requirements and for minimal inconvenience to the Owner. Notwithstanding, the Work must be prosecuted in a manner that is consistent with the meaning and intent of the operations, safety, and security conditions that are stated in this document, at the expense of the Contractor.

The following conditions apply during all phases of the Project's construction and for the accomplishment of the Work. The Contractor shall abide by the Conditions and include in the Bid Price, the Contract Amount, and the Contract Time all measures for the design, planning, implementation, and achievement of the Conditions and the Work in accordance with the Contract and this Document, at no further cost to the Owner.

1. General Object

This document outlines the operations, safety and security conditions to be respected and complied with during construction, to ensure that construction activities do not compromise the operation of the facility; and the security, safety and well-being of the property, staff and the public, all in conformance with applicable safety legislation and best practice while continuing to provide a safe and secure working environment for staff and visitors.

Nothing in this document shall supersede the requirement that the Contractor is fully responsible for organising the ways and means of the accomplishment of the Work as Constructor under the OSHA and other legislation governing the Work as set out in the Contract. Personnel shall, at all times, adhere to safety regulations and rules applicable to the construction site and in no way interfere with the progress of the construction programme.

The Contractor agrees to observe and abide by all policies in force on the City of Waterloo's property including but not limited to, Harassment and Discrimination, Safe Workplace, Code of Conduct and AODA.

2. Requirement for Planning of the Work

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The Contractor shall prepare a Construction Operations, Safety, and Security Plan (referred to herein as "the Plan"), in written and graphic form, that sets out the manner in which aspects of the required work are accomplished within the Existing Conditions, and specifically how the requirement for separation between construction activities and areas under the direct control of the Contractor is established and maintained throughout the accomplishment of the Work.

The Contractor shall submit the Plan to the Owner for the Owner's review and acceptance. The Plan shall state the methods and any responsibilities for communication requested in the Plan from the Owner or any actions that the Owner is expected to undertake during the performance of the Work by the Contractor.

The Owner may require additional information or detail regarding aspects of the Plan, revisions to the Plan where it does not reasonably conform to the conditions set out in this Conditions document or the Contract, and resubmission.

The Plan must be accepted by the Owner prior to the commencement of construction activities on the property.

A copy of the Plan bearing the Contractor's signature and evidence of its acceptance by the Owner shall be kept at the site at all times, fully available for the use of the Owner and Consultant, and inspection by authorities having jurisdiction.

A copy of the Plan shall be provided to authorities having jurisdiction for their comment and acceptance. All revisions to the Plan required by authorities having jurisdiction shall be implemented by the Contractor at its sole expense.

The Plan shall, in addition to the above-noted requirements, address and provide for procedures and requirements as identified in Appendix 1 to this document, which forms an integral part of this document.

3. Subcontractors and Suppliers

In addition to being bound by these conditions as a condition of the Contract, the Contractor shall bind all subcontractors to these conditions as set out in the General Conditions of the Contract, and shall ensure that all Subcontractors provide written acceptance of these Conditions and the accepted Plan.

The Contractor shall retain a copy of each Subcontractor's written acceptance of the Plan onsite at all times.

4. Responsibilities of City of Waterloo Staff

The City's Project Manager will be the Owner's representative during construction and is the contact for site operational concerns. The City's Project Manager shall coordinate any input on the requirements and performance of requirements under this Conditions document as they may affect the property operations. Contractors shall take into account the impact of its Plan on property operations continuously and without exception. The key

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items of concern are safety and security; separation of construction activities from occupied areas of the property; service activities, decorum, and proper performance of temporary measures by the Contractor that may affect these issues.

Other than as a liaison for communication regarding implementation of aspects of the Plan, as the contact for notifications and requests of permission to schedule and implement procedures under the Plan, and as the person having input on the Contractor's performance of the Work with respect to the accepted Plan, the Owner shall have no other duties or responsibilities under the Plan for its successful implementation.

5. General Description of City Hall Hours of Operation

Waterloo City Hall is heavily occupied by City staff and community members, making its continued operation critical. The contractor must work closely with the City to facilitate ongoing operations during the course of the work. Schedule to be confirmed by the City. Construction must be scheduled to minimize impact on users.

Owner reserves the right to reasonably change the operating hours during the Contract Time, at no cost to the construction contract amount.

6. Limitations of Operations

The actual hours and scheduling of construction work shall be agreed upon prior to commencement of the Work, as set out in the Contractor's Plan. In general there may be restrictions upon the construction schedule that result from property operation. Work to aspects of the property and its facilities may be undertaken while these are in operation only where the Contractor establishes clear barriers or boundaries to separate work areas and environmental effects from areas under the control of the Owner, so that the OHSA and all other applicable safety and construction legislation is fully complied with for separation and retention of the Contractor's status as Constructor. At no time may the Contractor or any of the Contractor's Subcontractors or Trade Contractors design ways or means, document, or perform the Work in a manner that may jeopardise the Contractor's status as Constructor for the purposes of this Contract and Work. The Contractor is directed to the General Conditions and Supplementary Conditions in further respect to this matter.

The Contractor shall, at all times, maintain the buildings' grounds by keeping them clean, unobstructed and clear of machinery and supplies to allow the normal, everyday operations of City staff, users and affiliates to continue operations, using designated access routes as indicated on the project documents. The Contractor shall clearly delineate areas of direct control at all times using such methods as barricades, tapes or similar. The Contractor shall post contact number in a highly visible area and shall respond to site/fencing concerns within 4 hours.

City staff shall have the **RIGHT-OF-WAY** at all times on all areas of the property except within areas under the direct control of the Contractor as set out in the Plan. In the event of conflicting traffic movement, all construction vehicles and personnel shall yield.

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Access to the construction site shall be coordinated with the City. Contractor shall organise construction activities so as not to obstruct regular access.

Power shutdowns **must** be planned with consideration for the operation of the property. The Contractor can use existing power, water, and systems temporarily, without metering and payments, provided it makes all arrangements for separate distribution from the main panel or water service. The Contractor is to provide all temporary connections.

Mechanical and electrical service must be maintained for City staff use and operations.

No smoking is allowed within 9.0m of all doorways to buildings. Smoking is prohibited at all picnic shelters and pavilions, all permanent and temporary reserved seating areas and designated event, festival and entertainment areas, and within 20.0m of playgrounds or sports areas. If smoking is allowed at the site, it shall be to a location within the Contractor's delineated Site boundary, and a suitable disposal system must be provided and maintained by the Contractor at no cost to the Owner. No smoking shall be allowed in any building, even under construction. The Contractor and construction personnel may smoke only in the designated smoking area.

7. Responsibilities of Contractor

The Contractor shall provide the Plan, and shall provide all measures necessary for the proper and complete implementation of the Plan and performance of the Work in accordance with these Conditions and the Conditions of the Contract.

The Contractor shall provide all onsite construction forces with the City of Waterloo's safety and procedures orientation as transmitted by the Owner prior to such forces performing work on the property.

The Contractor shall ensure that a supervisory staff member and/or person responsible for all aspects of the implementation of the Plan and with the authority to rectify any situation, is on site at all times that work is being performed under this Contract.

All Work shall be completed within the confines of properly constructed separations. The Contractor shall cordon off access routes as necessary to satisfaction of requirements and the Owner.

The Contractor shall ensure that its employees, all Subcontractors and their employees carry out the work in compliance with all legislative requirements, the Contract requirements and the Plan, in accordance with these Conditions.

The Contractor shall schedule the aspects of the Work to dates and times that enable the Owner and park users to continue operations with minimal disruption. Co-ordinate all interruption of site services with the Owner's designated representative. Any interruption of service shall be scheduled at the Owner's pleasure during off-hours. No interruption shall be of more than a 4 hour duration without special procedures at Contractor expense.

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The Contractor shall be responsible for the repair, restoration and cleaning of all grass, pavement or gravel areas used for access beyond the working limits shown on the Contract drawings and damaged as a result of the Work.

8. Communications

The Contractor is responsible for ensuring proper communication with authorized representatives of the Consultant, the City of Waterloo (the Owner), Subcontractors, authorities having jurisdiction, emergency assistance (fire department, emergency response, and police services) and others. To that end, the Contractor shall ensure that there is a telephone on site at all times and that the Consultant, and Owner's representatives are informed of the numbers and all alternative and emergency means of communication.

Provide a telephone list to the Consultant and Owner of responsible personnel to be contacted in case of an after-hours emergency.

The Contractor shall communicate directly only with the Consultant, and the Owner's Project Representative as appropriate for the subject of the communication. All changes to contract requirements, contract time, and contract amount are by the Owner's construction contract authorized representative in writing, through the issuance of a Change Order only. No verbal instruction from any Owner representative shall alter the Contract in any way.

The Contractor shall provide regular progress updates regarding the Plan at all site meetings, and shall provide written report of incidents and follow-up that are to the satisfaction of the Owner.

The Contractor shall post signage for the workforce and delivery vehicles to indicate parking and delivery requirements and routes, and provide clear communication to all forces arriving to the property, PRIOR TO ARRIVAL, regarding the proper procedures for deliveries, sign in, and communication. The Owner will not accept deliveries for any reason.

9. Security

The Owner has a security protocol program in place. The Contractor shall be expected to comply with the requirements of this system and replicate it for all construction personnel to ensure compliance of all subcontractors. It is expected that the Contractor shall ensure that areas under its control are secured at all times. Under no circumstances shall unauthorized personnel be permitted on the property or Place of the Work. Work forces may not be present on site without the supervising presence of the Contractor's supervisory personnel.

Prior to commencement of construction, limits shall be established to outline restricted areas of the building and hours of operation and procedures for work access to such restricted areas of the building.

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10. Special Health and Safety Situations

The Contractor shall advise the Owner within the Plan of any identifiable and unique health and safety risk posed by the performance of the Work that cannot reasonably be avoided and that cannot be fully mitigated by the Contractor in accordance with its responsibilities under the Contract and these Conditions, in order that the Owner may take steps to protect its property, staff, and visitors.

Such situations may include welding arc brightness. The Contractor shall effectively shield all occupants and potential passersby from the brightness of welding operations.

11. Site Cleanliness

Areas under the control of the Contractor must be maintained in a neat, safe and orderly fashion. The Contractor is expected to take steps to control dust, refuse, and materials to ensure their negative impact on the operations of the park area is minimized.

The Contractor shall clean up the site and areas where work is performed on a daily basis as a minimum requirement. All debris such as paper, paper cups, plastic lunch bags, etc. shall be removed immediately. The Contractor is to ensure that all access roads to the property are kept clean and free of debris.

Disposal and recycling of debris and waste shall be made off-site, as applicable and to the acceptance of the Owner, in accordance with applicable legislation and the Contract Documents.

Any areas under the Contractor's control not kept sufficiently clean shall be brought to the Contractor's attention for immediate action. In the event that the Contractor does not take immediate action, the area shall be cleaned by the Owner's personnel and all costs charged back to the Contractor.

12. Fire Control

The Contractor is to ensure the proper disposal of wastes and storage of flammable materials. During any work that has a risk of fire and/or combustion, the Contractor is to employ proper controls, procedures including the provision of protection measures, fire watches, and extinguishers, to eliminate the risk posed by the operation.

In every instance where hot work is performed, the Contractor shall provide a fire watch to the area of the hot work for a minimum of 2 hours following the completion of such hot work, and to such longer periods as reasonably necessary to ensure that fire or safety hazards have not arisen as a result of the hot work.

13. Water and Power Services

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The Contractor shall be allowed to use the Owner's electrical power and water supply only in accordance with the provisions of the Contract Documents. The Contractor is to provide all temporary connections.

14. Parking

Parking spaces will be available on-site and shall be agreed upon prior to commencement of the Work. Further arrangements can be made with the Owner.

15. Deliveries

Delivery vehicles shall be promptly unloaded and removed immediately thereafter. The Owner shall not accept deliveries or communications on behalf of the Contractor.

Deliveries shall not be left or stored outside the confines of the construction site designated storage areas.

16. Noise Abatement

The Contractor is expected to take reasonable steps to control noise and to ensure its negative impact on the Owner's operations is minimized.

17. Public Site Special Consideration and General Site Decorum

Special consideration and sensitivity to safety, dignity of individuals, appropriate behaviour, and general site decorum shall be required throughout construction areas and the construction period. This includes the interior of any onsite trailers and job boxes. Remove any items and eliminate any behaviour through effective education and communication, and in every instance immediately upon notification by the Owner or Consultant.

18. Pre-Construction Meeting

During the Pre-Construction Meeting, the following items shall be discussed at a minimum:

1. The draft Plan as prepared by the Contractor, distributed 48 hours prior to the meeting
2. Items arising from these Conditions
3. Restricted Areas
4. Construction Schedules and Timetables.
5. Special Site Consideration and General Site Decorum
6. Other agenda items as noted in the Contract Specifications.

Following this meeting, The Owner shall sign below to indicate that it has discussed the Operations, Safety and Security Conditions fully with the Contractor and answered all questions concerning this document.

Owner's Representative

Date

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Following this meeting, the Contractor shall sign below to indicate its acceptance of the validity of the Owner's statement above, and its intention to abide by these Conditions in the formulation its Plan and performance of the Work.

Contractor

Date

The Contractor shall obtain signatures of all trade subcontractors upon the copy of the accepted Plan that is retained for use and review at the place of the Work, stating their acceptance of and their intention to abide by the provisions of the Plan. Such copy shall remain on file at the job site for the duration of construction.

The Plan shall contain the following statements to which all signatories shall abide, in addition to a general statement regarding acceptance of the requirements of the Plan and their intention to abide by it:

The undersigned is/are also aware that anyone under their supervision may be dismissed from the subject job site for failing to comply with the Operations, Safety, and Security Conditions of the Owner and the Plan of the Contractor. Furthermore, repeated infractions shall jeopardize a company's ability to work for the Owner. The undersigned must ensure their company and employee(s) are informed and follow the OHSA and its associated regulations.

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Appendix 1: Items to be specifically addressed by the Contractor's Operations, Safety, and Security Plan to the satisfaction of the Owner:

1. Deliveries
2. Personal Protective Equipment and Protocols required in areas under the Control of the Owner
3. Dismissal from property for failing to follow safety rules
4. OHSA Requirements and how addressed to ensure maintenance of Constructor status by the Contractor, Procedures for take-over of areas by the Contractor and return of areas to the Owner's Use
5. Safe Lock Out / Tag Out and Testing Procedures, Handover of operational systems upon completion of portions of the Work
6. Hazardous Material and Spills Procedures
7. Confined Space Procedures
8. Notice of Accident or Incident
9. Welding and Cutting, Hot Work
10. Housekeeping and Cleaning Requirements
11. Ladders, scaffolding, underpinning, and other construction aids
12. Procedures for use of lift trucks, booms, and other equipment and rolling stock
14. Fall Protection Training and adherence to measures
15. First Aid and Emergency Procedures
16. WSIB Clearance Certificates, Training Certifications and Evidence
17. WHMIS and Storage Procedures
18. Emergency Evacuation Procedures
19. Procedures for Security Sign-in and Security Provisions
20. Other Operational, Safety, and Security Provisions of the Contract
21. Other Issues

End of Document

1. GENERAL

1.1. The Documents

1. The Documents include all Owner's bid forms (including but not limited to Instructions to Bidders, Bid Forms, Supplemental General Conditions, Modifications to Articles and Definitions, Special Provisions, Appendices, etc.), Drawings, Specifications Divisions 00 to 49 inclusive, and addenda, all as listed below. Only the electronic copy of the Documents and the electronic copy of addenda as uploaded by the *Owner* to its electronic bidding system website, constitute the Documents. All other versions of documents are only informal copies.

1.2. Contract Documents

1. The *Contract Documents* are defined in accordance with Document CCDC 2-2020 Article A-3, as modified in the Documents, and are additionally listed in this Section.
2. Upon award of *Contract*, the *Owner* will prepare *Contract Documents* for signing which include but is not limited to the completed Bid Form, all completed Supplementary Forms, all Addenda as issued during bid, all items referenced in Article A-3 of the CCDC 2-2020 as defined in the Definitions therein referenced, and all drawings and specifications noted in this Section. The act of bidding constitutes acceptance by the bidder that the above noted documents will be included in the *Contract*, together with such other documents as determined by the *Owner*. The *Owner* is not bound by this condition.
3. Instructions to Bidders do not form a part of the *Contract Documents*, except as otherwise noted.

2. LIST OF DOCUMENTS

2.1. Drawings and Specifications

1. The following list of drawings and specifications are titled "City of Waterloo 2nd Floor Renovations" and noted as issued for purpose "Tender and Permit, March 21 '25".
2. The drawings consist of fourteen (14) 48" by 36" Architectural (A) drawings as follows:

A001 General Notes & OBC Matrix
A201 Removals Plan
A211 2nd Floor Fit-Up Plan
A212 Plan Details
A213 Section Details
A221 2nd Floor Partition Dimension Plan
A231 2nd Floor Floor Finishes Plan
A501 Removal Reflected Ceiling Plan
A511 Reflected Ceiling Plan
A711 Millwork Details
A801 Interior Elevations
A802 Interior Elevations
A901 Openings Schedules
A911 Room Finishes Schedules

Further to the above, the drawings include two (2) Mechanical (M) drawings as follows:

M1 Mechanical Demo Plan
M2 Mechanical Plan

Further to the above, the drawings include four (4) Electrical (E) drawings as follows:

- E1 Electrical Schedules & Specifications
- E2 Electrical Power Plan
- E3 Electrical Life Safety Plan
- E4 Electrical Lighting Plan

3. The Specifications consists of Sections as listed in Section 000000 - List of Contents and as noted on the Drawings wherever stated as Specifications.

3. REFERENCE DOCUMENTS

- 3.1. In conjunction with the Contract Documents, the following documents shall be inspected and examined by the Bidder prior to bid submission, so that all requirements resulting from the conditions of service and coordination with the project are incorporated by the Proponent into the design and installation of the Products, the execution and performance of the Work, and the design of the ways and means for accomplishing the Work and the Contract Time. The reference documents consist of:
 1. Updated and Issued for Construction Architectural drawing package for Waterloo City Centre titled "Waterloo City Centre", as prepared by Crang & Boake inc., dated July 14 1986, consisting of 18 (eighteen) 42" by 36" Architectural drawing sheets.
 2. iGuide floor plan of Waterloo City Hall, dated October 23 2023.
 3. Addendum #3 package titled "Partial 2nd Floor Renovation - Waterloo City Hall", as prepared by IBI, dated August 4 2021, consisting of 13 (thirteen) pages, including 5 (five) 36" by 24" Architectural sheets, 2 (two) 36" by 24" Mechanical sheets and 4 (four) 36" by 24" Electrical sheets.
 4. Second Floor Mechanical Plan, as prepared by Dialog, dated April 7 2011, consisting of 1 (one) 46" by 33" sheet.
 5. Waterloo City Centre HVAC & Plumbing Assessment, as prepared by DEI Consulting Engineers, dated November 2022, consisting of 61(sixty one) sheets including drawings.

4. ADDENDA

- 4.1. Addenda may be issued by the Owner or Consultant prior to the submission of bids. Conform to Instructions to Bidders regarding Addenda, and include all Work described by Addenda in the proposed contract amount, contract time, and contract schedule.

END OF SECTION

DIVISION 01:
GENERAL REQUIREMENTS
COVER

DIVISION 1:
GENERAL REQUIREMENTS
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011010 GENERAL PROJECT REQUIREMENTS

1. DESCRIPTION OF WORK

- 1.1. Work of this Contract is the renovation and 2nd Floor interior fit-up of the following Tenant demised spaces located in the existing Group D three-storey Waterloo City Hall building located at 100 Regina St. South in Waterloo:
 1. New Human Resources and Finance Department Space: presently vacant, removed an existing washroom and renovated from Tenant office uses to owner-use office.
 2. New Planning Department Space: presently office use, renovated with new layout.
- 1.2. The Work includes provision of products and materials shown on the drawings, Building Systems performance, and related construction and design services, all as described in the Contract Documents. Provide for all setting out, co-ordination, administration, liaison with authorities, construction, and include measures for the safety and protection of the Work, existing conditions, building occupants, workforce, and the public. Provide all items of work reasonably inferable as necessary for the construction, regardless of whether shown on drawings, at no further cost to the Owner.
- 1.3. The intent of the Project is to provide the City of Waterloo (also referred to as CoW) with relocated the Human Resources and Finance Departments from ground floor to a 2nd floor area previously occupied by the Hicks Morley firm. The CoW is depending upon the performance and completion of the Work of this Contract in accordance with its requirements and achievement of schedule milestones as set out in Section 013020 Construction Schedules.
- 1.4. The Contractor shall obtain clarification of requirements from the Owner, in all cases of uncertainty prior to proceeding with aspects of the Work.
- 1.5. The Contractor shall employ subcontractors (referenced through the documents as Subcontractors or Trade Contractors), suppliers, tradesmen, and labour that have clearly demonstrated experience in achieving the requirements that form an integral part of the Work. This includes the ability to integrate work and services to achieve design intent using further design and services as necessary to continue the design through the construction phase of the project.
- 1.6. The design that forms the basis for the work described involves the integration of aspects of the construction into distinct Building Systems that are identified in the Contract Documents, and more particularly in Division 1 of the specification. The Contractor shall examine requirements, organise the planning, and direct the performance of the Work so as to achieve the prescriptive and performance standards for each Building System that is identified in the Contract Documents.
- 1.7. The construction is not targeting a LEED certification, however the Work must conform to sustainable construction practices and requirements for performance of the Work as set out in the Documents and the Owner's instruction.

2. SCHEDULE

- 2.1. The Owner requires, and it shall be an integral part of the Contract, that work is performed in a timely and efficient manner, without delay, and with proper planning and co-ordination of the Work. The Contract is to be substantially completed on or prior to the dates identified in the completed tender form and elsewhere in Division One of this specification.
- 2.2. The Owner requires that the Work be undertaken in accordance with a plan and schedule of construction organisation. This plan shall be submitted by the Contractor to the Owner for review and acceptance. Particular requirements for the construction schedule and means for the work are described elsewhere in Division 1, and the Owner's Operation, Safety, & Security Conditions.

3. DOCUMENTS REQUIRED

- 3.1. Maintain at job site, one copy each of following:
 1. Complete Contract Documents;
 2. Complete Permit Documents;
 3. Construction Forms as issued by the Consultant, including but not necessarily limited to Site Reviews, Supplemental Instructions, Notices of Proposed Changes, Change Orders and Change Directives;
 4. All documents relating to any modifications to the Contract;
 5. Reviewed and accepted Submittals;
 6. Reviewed and accepted Construction Progress Schedule, updated regularly;
 7. Manufacturers' installation and application instructions for all Products;
 8. Reference Standards listed in the Specifications, and throughout the Documents, to which the work shall conform;
 9. Copies of all applicable regulations and legislation in force at the place of the Work;
 10. Copies of all inspection reports of Authorities Having Jurisdiction, Owner's materials testing & inspection firm, and other 3rd parties as may be applicable; and
 11. Contractor's red-line as-built drawings, updated regularly as the work progresses.

4. EXISTING CONDITIONS

- 4.1. Existing conditions are as described in the documents. Notify Owner immediately of conditions at variance with information reasonably inferable from documents examined by the Contractor and the Contractor's inspection of the Site.
- 4.2. Incorporate existing conditions into the design of the ways and means of performing the Work, and include all costs related to performance in accordance with the existing conditions as described.

5. EXISTING SERVICES

- 5.1. Where Work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities and Owner, and outside of Facility Operating Hours. Refer also to Facility Operations, Safety and Security Conditions.
- 5.2. Before commencing Work, establish location and extent of service lines in area of Work and notify Consultant of findings.
- 5.3. Submit schedule to and obtain approval from authorities having jurisdiction for any shut-down or closure of active service. Adhere to approved schedule and provide notice to affected parties.
- 5.4. Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

- 5.5. Remove abandoned services. Cap or otherwise seal lines at cut-off points as directed by Consultant.
- 5.6. Record locations of maintained, re-routed and abandoned service lines.

6. ADDITIONAL DRAWINGS & SUPPLEMENTAL INSTRUCTIONS

- 6.1. The Consultant or Owner may furnish additional drawings and site instructions to clarify intent of Contract Work. These items have same meaning and intent as if they were included with drawings referenced in Contract Documents. Perform work in accordance with such items.

7. IMPERIAL PROJECT

- 7.1. This project is documented in the Imperial System. Where measurements are expressed in imperial units, and depending on the progress made in the various sections of the industry, such measurements may be either hard or soft converted units.
- 7.2. All units specified shall be taken to be the minimum acceptable unless otherwise noted.
- 7.3. It is the Contractor's responsibility to check and verify with manufacturers and suppliers on the availability of materials and products in either metric or imperial sizes. Where a material or product cannot be obtained in the imperial size specified, provide the appropriate metric size available.
- 7.4. Where both metric and imperial sizes or dimensions are shown, the imperial size or dimension shall govern.

8. RELICS AND ANTIQUITIES

- 8.1. Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on site or in building, shall remain property of Owner. Protect such articles and request directives from Consultant. Give immediate notice to Consultant when such finds are encountered during construction, and await the Consultant's written instructions before proceeding with work in this area.

9. CLARIFICATIONS TO DEFINITIONS AND ADDITIONAL DEFINITIONS

- 9.1. Throughout Division 1 there are defined terms. Note that where a term is defined wherever in the *Contract Documents* it shall apply throughout the *Contract Documents*. The Contractor shall inspect the definition of terms as set out in CCDC2-2020 as modified by the Owner's Supplementary Conditions, and shall further note the following:
 - 9.1. *Provide* means to supply and install. The term *provide* shall be read to mean in all cases "provide by the Contractor as part of the Work" unless the context specifically states that the Owner or Consultant or authority having jurisdiction shall provide the item referenced.
 - 9.2. *By Others*, when used in the Contract Documents, shall not mean by someone other than the Contractor. The item shown is required by the Contract, but may be provided by another design or Trade Contractor, or Supplier. The only means by which something shown or specified is indicated as not being required by the Contract is by the use of the initials "N.I.C." or the word "not in (the) Contract" or "by Owner".
 - 9.3. *Exposed* means visible by the occupants at Completion of the Contract, unless indicated otherwise. This includes but is not limited to roofs, mechanical and service spaces, millwork interiors and surfaces visible from any point in the occupied finished Work, such as door tops & bottoms, shelf and bulkhead tops, and interior portions of ductwork through grilles & diffusers.

- 9.4. *Facility* means the improvements and their commissioned functional operation that are to be constructed and/or altered by the Contractor as the outcome of the Project and pursuant to the Contract. Facility includes but is not limited to both existing and new portions of the property and building or buildings that are affected by the Work.
- 9.5. Where the words "Reviewed", "Instructed", "Accepted", "Required", "Directed", "Permitted", "Inspected", "Ordered" or similar words are used it shall be understood that they mean, unless the context provides otherwise, "reviewed by the Consultant", "instructed by the Consultant", "accepted by the Consultant", "required by the Consultant", "directed by the Consultant", "permitted by the Consultant", "inspected by the Consultant", and "ordered by the Consultant."
- 9.6. Where the words "satisfactory", "submit", or similar words or phrases are used in the Contract Documents, it shall be understood that they mean, unless the context provides otherwise, "satisfactory to the *Consultant*" and "submit to the *Consultant*".

011020 SPECIAL PROJECT REQUIREMENTS

1. GENERAL

- 1.1. Contractor and Trade Contractors are to thoroughly review all sections and divisions of the specification, and the drawings, to ensure that work of this section is understood together with all related items of the Contract.
- 1.2. Special Project Procedures are also identified and referenced elsewhere in the documents. All measures to protect the Work and protect the public against damage and injury are included in the Work and the Contract Amount. Perform the Work and protect on the basis that the Place of the Work will be subject to attempts at mischief and break-in, at no cost to Owner.
- 1.3. Throughout the specification, performance standards and/or terms may be defined for the explicit purpose of this Contract and its requirements. Similarly, reference may be made to particular expertise or knowledge that the Contractor shall provide either directly or through Subcontract with Trade Contractors, for the means and methods by which such performance standard is to be met or the Products supplied and installed. This may include reference to specific existing situations in the locality of the community or work, or to industry-specific examples, that are identified as meeting the required standard. The Contractor is specifically cautioned that the Work, such standards, and such terms include these special project conditions. No industry practice, norm, or Contractor or Trade Contractor practice shall affect the requirement that the Work be undertaken to meet or exceed such standards, performance requirements, or terms.

2. SITE SAFETY, HOARDING & SECURITY

- 2.1. The hoarding requirements for this Contract include the construction of site enclosures to effectively separate public areas from construction areas. Such areas shall be enclosed of material suitable in accordance with referenced standards and applicable legislation, and secured to prevent unauthorised entry. Ensure security of both the area of the Work and the remainder of the existing facility against vandalism so that the security of the facility is not compromised. Provide all hoarding and security for the duration of the Project and pay all costs for this protective hoarding.
- 2.2. The Contractor shall submit its site safety, hoarding and security plan to Authorities Having Jurisdiction and the Owner's Landlord for approval prior to construction start.

3. CONSTRUCTION SEQUENCE

- 3.1. Design and provide all Work required to sequence the construction, as described on drawings and elsewhere in the specification. The Work must be performed with scheduling that will not conflict with the Owner's Landlord's use and enjoyment of the portions of the property or facility not under the Contractor's direct control. This includes accommodation of the Owner's Landlord and its tenants.
- 3.2. Provide all means and methods, and sequence work including for multiple visits of trade contractors as necessary to comply with the Work, so that the Owner's requirements for timing and approach to portions of the Work are respected and guide the Work. Pay all costs for arranging the performance of the Work in this manner. Trade Contractors and Subcontractors and Suppliers are bound by this condition, and shall submit upon request such information as reasonably required by the Consultant so that the Consultant can determine that portions of the Work are organised to comply with requirements for sequencing as set out in the Contract.

4. REQUIREMENTS FOR CONTINUOUS ACCESS AND CIRCULATION

- 4.1. The sequence of construction and organization of the Work must at all times defer to and incorporate the requirements for continuous access to adjacent properties and portions of the existing facility. The contractor shall provide temporary routes, shall schedule shutdowns and interruptions, and shall design the ways and means for accomplishing the Work to ensure continuous use and access through these areas.
- 4.2. The Contractor shall fully incorporate in its design of the ways and means for performance and accomplishment of the Work: the requirements of the Site Access and Arrangement as set out in drawings and specifications, the Existing Conditions Section 002000, and the Owner's Operations, Safety, and Security Conditions. Incorporate all such conditions at no further cost to the Owner or adjustment in Contract Time.

5. SPECIAL PRODUCT INSTALLATION AND COMMISSIONING REQUIREMENTS

- 5.1. It is a requirement of the work of this Contract that all products and materials likely to off-gas as a result of their newness of manufacture, be supplied and installed so as to minimise the off-gassing. Provide temporary ventilation and/or protection to existing systems and occupied areas (including areas to be occupied during construction off-hours, so that cross-contamination with existing and operational portions of the facility is avoided and areas returned temporarily to the Owner's control and use are free of contaminants.
- 5.2. Products, materials, and processes that may require such special provisions include but are not limited to welding, painting, adhering and sealant work, roofing, spray applied materials and products, processes that generate dust, and work that may compromise the integrity of water supplies, environment, means of egress or exiting, or safety.
- 5.3. Provide all protection to the areas adjacent the work, and the public, from generation of noise, dust, arc of welding, and all other processes of installation and commissioning that may pose a hazard to the public from any publicly accessible area adjacent the Work.
- 5.4. Requirements for commissioning of Work and systems are further described elsewhere in the specification, to ensure indoor air quality at time of handover, following building flush out that is further specified in this Division.

6. REQUIREMENTS FOR BEHAVIOUR, DECORUM AND WORKPLACE CULTURE

- 6.1. Requirements for personal clothing and dress begin with workplace safety legislation, which requires personal protective gear and clothing as appropriate for the workplace. Long pants, shirts with sleeves, clothing that protects workers on electrical systems from arc flash and similar requirements shall be followed by all personnel at the Place of the Work. In addition, clothing shall be worn that communicates to all others at the Place of the Work and to the public a professional standard of conduct and respect for the dignity of self and others, regardless of age or gender. The Contractor shall enforce these standards and requirements throughout the Place of the Work.
- 6.2. Requirements for behaviour, decorum and workplace culture begin with strict adherence to applicable laws, regulations, codes and standards that govern our society and the workplace. The Contractor, all Subcontractors and Suppliers, the Consultant, the Owner, and all members of their respective workforce shall perform work and conduct themselves in relation to each other and the public in a courteous and professional manner that communicates respect for the dignity of self, for one another, and respect for the following Core Values:

The rule of law, honesty, integrity, dignity of the person, leading by example, respect for diversity, and the promotion and maintenance of a workplace free of abuse, discrimination and harassment.

- 6.3. The Contractor shall establish and maintain an open, transparent, and well-communicated set of procedures for the deliberate promotion and maintenance of a workplace that upholds and provides leadership for the construction industry with respect to behaviour, decorum, and positive workplace culture. The procedures shall communicate and enforce the Core Values that govern relations within the work force, among the firms and entities involved in the Project, and in relations with the public. This shall include a mechanism for binding all Subcontractors and their employees and representatives to this standard and requiring enforcement of this standard at all levels of the construction contract chain. This shall include a mechanism for reporting, investigating, and resolving any complaint regarding failure to achieve these standards or the required workplace culture, without negative consequence for any complainant.
- 6.4. There shall be no posting or display of images or language (whether in job trailers, within job boxes, vehicles, on clothing, or anywhere else at the Place of the Work) that may be reasonably be construed by others as failing to uphold the Core Values that form the standard for the required workplace culture.
- 6.5. There shall be no broadcast of music, sound, speech, action, gesture, taking or dissemination of photos or images, or other similar display or sharing through personal devices or otherwise of material that may be reasonably construed by others as failing to uphold the Core Values that form the standard for the required workplace culture.
- 6.6. Any findings of the Consultant with respect to the requirements shall be considered final and shall be acted upon immediately by the Contractor, Consultant, or Owner as the case may be. Such findings and actions shall be without prejudice to any other right or responsibility that a worker or firm may have with respect to applicable law regarding such matters.

7. HAZARDOUS MATERIAL ABATEMENT AND TREATMENT

- 7.1. The Contractor and all Subcontractors and Suppliers that are engaged in the provision of portions of the Work for installation of the Work are specifically cautioned that all ways and means necessary for the abatement of hazardous materials, designated substances, and treatment of potentially harmful elements, as set out herein and elsewhere in the specification and reference documents, forms a special requirement of the Work in response to the existing conditions. Pay all costs and be responsible for this work wherever the Contract Documents or Reference Documents identify such substances either in existing conditions or new work.

- 7.2. All trade contractors shall design procedures, implement protection for workers, and perform material removal and salvage in accordance with a design approved by authorities having jurisdiction, at no further cost to the Owner. Special requirements for working conditions in the presence of designated materials and hazards, and the requirements for abatement in re-used material, and the requirements for disposal of such material where not identified for re-use in the finished Work, are further set out in the OHSA, by the Ministry of Labour requirements and guidelines, in other applicable Federal and Provincial legislation, and elsewhere in this specification.
- 7.3. The Owner is not aware of hazardous materials or designated substances at the Place of the Work.
- 7.4. Wherever the Contractor, any Trade Contractor, or any worker uncovers or believes to have uncovered the potential for presence of Hazardous Material or Designated Substances in the Work, the aspect of the Work being performed shall immediately be stopped and the area protected. The Contractor shall be informed and shall seek instruction and clarification from the Owner and Consultant regarding the presence, or possible presence, of the substance or material.

8. EXISTING BUILDING SERVICES CONSTRUCTION REQUIREMENTS

- 8.1. The Contractor shall perform the Work with due regard for the risks associated with construction activities as they may impact transmission of noise, dust or other contaminants throughout the Place of the Work, to or from or throughout existing or new Building Systems, and to surrounding facilities and the public way.
- 8.2. All building systems shall be protected from infiltration of any kind that results from the construction process. Schedule the installation of piping, electrical, plumbing, HVAC, and similar so that pipe, ductwork, conduit or other aspects of a Building System so that disruptions are minimized and contamination is eliminated. Supplies and returns from such systems where they open into areas under construction, and provide bypass to ensure that performance of the existing system and its components is not compromised.

9. BUILDING PERMIT AND REGULATORY INSPECTIONS

- 9.1. The Owner will apply and pay for the Building Permit required under the Ontario Building Code. Contractor is advised that workload at the authorities having jurisdiction may delay permit issuance.
- 9.2. Application and payment for all damage deposits, and other permits, licenses, fees and costs remain the responsibility of the Contractor. For clarification, the Contractor is required to post all damage deposits required by the authorities having jurisdiction as a condition of permit issuance.
- 9.3. Obtain copy of Building Permit from Owner, complete with drawings on which authorities having jurisdiction may have made comments, and examine same. Advise Consultant of any changes required, complete with associated costs
- 9.4. Arrange all required inspections by authorities having jurisdiction on behalf of the Owner.
- 9.5. The Contractor applies for, pays for, and obtains all other required permits for the Work.

10. PRE-CONSTRUCTION SURVEY

- 10.1. Prior to commencing work, complete a survey of existing conditions within work area(s) and along path of travel for goods to be delivered and removed from the site. This survey includes all areas of adjacent properties and the public way for a minimum of 10'-0" (3.0m) from the Site and further as reasonably required to ensure that existing conditions of adjacent lands, adjacent areas of the property, and the public way are known and recorded in detail.

- 10.2. Owner will accompany Contractor on inventory tour. Arrange mutually agreeable time for survey.
- 10.3. Inventory all existing damage, accurately recording all observed conditions. Use photographs, written records, spreadsheets videography, etc. to fully document existing conditions, noting existing damage in sufficient detail to act as record of conditions.
- 10.4. Prior to commencing demolition or construction, provide copy of inventory records to Owner and Consultant. Owner will review submission. Revise and resubmit rejected inventory. Demolition and/or construction may only commence after acceptance by Owner of inventory records.
- 10.5. Repair and make good any damage found subsequent to submission of inventory, which in the opinion of the Consultant is the result of the Work, and which is not documented in the inventory submitted to the Owner and Consultant to Owner. Repairs shall return damaged elements to their condition prior to start of work. Where work increases extent of existing damage, repair shall return element to match previous damaged condition. Refer to CCDC2-2020, GC 9.1.
- 10.6. Where repairs cannot, in the opinion of the Consultant, be expediently implemented the Consultant shall ascertain the value to be deducted from the amounts due the Contractor in the manner permitted under CCDC2-2020, GC 2.4.

11. OTHER CONTRACTS: LEGISLATIVE COMPLIANCE

- 11.1. Be advised that the Owner may let other contracts for other works on this property or within the existing facility, and the work of this Contract shall be organised by the Contractor in all cases to prevent the Owner becoming the constructor for any project, as defined in applicable Occupational Health and Safety legislation.

12. SUSPENSION REQUIREMENTS FOR SUSPENDED CEILINGS, MECHANICAL AND ELECTRICAL ELEMENTS, REQUIREMENTS FOR SEISMIC

- 12.1. Suspended acoustic tile ceilings, and suspended mechanical and electrical items shall be suspended from and anchored to structural loadbearing members. Where hangers and supports provided with Product are of inadequate length, size or strength, provide new suspension systems. The term *loadbearing* shall be as defined in the Ontario Building Code.

011030 WORK RELATED TO EXISTING

1. OCCUPANCY OF EXISTING BUILDING & SITE

- 1.1. The Existing property and building will be occupied by the Owner's Landlord and their Tenants through the course of the Contract Time, and the Work shall be organized to ensure that the Owner, The Owner's Landlord and their Tenants and Maintenance personnel have access to and use of spaces that are adjacent the areas under the Contractor's control, including for public entry, emergency entry and egress, deliveries and shipments to and from the building, garbage pick-up. Exceptions to this requirement involve scheduled and strictly observed shutdown periods only, as proposed by the Contractor and accepted by the Owner.
- 1.2. All services shutdowns must take into account the existing operations and civic requirements for services and facility operational continuity. Obtain Owner's acceptance of all proposed interruptions and minimize interruptions.
- 1.3. Maintain level of fire protection in existing building at all times, including existing fire separations and all existing protection measures which are to remain or to be exceeded in the finished Work. Maintain equivalent fire protection to adjacent buildings and areas as will be present in the finished

work where at all possible, and notify Owner of temporary duration and timing of increased fire exposures resulting from the performance of the Work.

2. PROTECTION

- 2.1. Provide temporary, secure, watertight and dust-tight partitions between enclosed areas within the existing building where work is performed which generates such dust, water or excessive humidity, in order to protect existing areas and finishes. Weatherproof openings made in walls and roofs of existing building, immediately as they are created. Pay costs for this work.

3. REMOVAL OF EXISTING WORK AND SALVAGE

- 3.1. Demolish only those portions of the existing building designated in Contract Documents and/or strictly necessary for incorporation of new work.
- 3.2. Remove building elements, components, materials, and equipment as required by the work. Salvage and relocate same and where indicated on Drawings. Pay all costs for this work. Store and protect relocated items from damage until built into new locations.
- 3.3. Limit removal of items to smallest areas possible, and make good disturbed items.
- 3.4. Salvageable items may only be used in new work where suitable and approved by the Owner by direct instruction in the Contract Documents or an approved Change Order amending the Contract Price and Time. Otherwise provide all new products.
- 3.5. Materials recovered from work in existing building which are not indicated in drawings or documents to be relocated or required by the Owner shall be offered at no charge to the Owner. The Contractor shall deliver the material to a storage place of the Owner's choosing on the property. Materials and products declined by the Owner become the property of the Contractor and shall be disposed of away from site. Pay all costs for this work.
- 3.6. Remove debris and accumulated dirt from existing building immediately. Ensure that during removal operations the existing building and new work are not damaged and dirt, debris and dust are not spread beyond the work area. Repair all damage promptly and pay all costs for such repairs.
- 3.7. Maintain work areas in existing building broom clean to avoid tracking of dirt into adjacent areas. Immediately clean up debris resulting from performance of the Work that is deposited outside of work areas. Make a daily inspection to ensure that existing conditions, work areas, and construction access areas are maintained clean and undamaged as specified.
- 3.8. Comply with requirements for interferences, cutting and patching specified in Section 013500.

4. NEW AND REPLACEMENT WORK

- 4.1. Make good materials, and prepare surfaces and refinish all finished surfaces damaged, marred, replaced, or otherwise remedy damage to materials and elements identified for salvage, relocation, re-furbishment or re-use in the newly constructed work. Pay all costs for this work.
- 4.2. Finish new surfaces flush with existing surfaces. Make junctions between 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 unless otherwise indicated.

5. CONTRACTOR'S USE OF PROPERTY

- 5.1. Limit access of construction personnel to existing building to locations and times strictly necessary for performance of the Work and in accordance with the Project Sequencing, the accepted Construction Schedule and the Contract Documents.
- 5.2. Prohibit lounging and smoking on the property.
- 5.3. Keep areas clean under work of contract, and return them to an "as was" condition at completion of construction. Replace, or make good as approved by the Owner, damage to building, fixtures and fittings caused howsoever. Include cost of installation and making good of other work thereby affected in replacement.

6. SERVICES IN EXISTING BUILDINGS

- 6.1. Ensure that existing services are not damaged during construction operations, wherever performed. Cut off and cap concealed services uncovered during work. Provide subsurface markers to capped services. Remove and reconstruct concealed services, and other elements of existing services where required to install new services. Pay all costs for this work and return such services to "as was" condition.
- 6.2. Should existing services be accidentally uncovered and disrupted, make complete restoration immediately, and ensure adequate protection to avoid further disruption until alternative means of providing permanent continuation of the services are made.
- 6.3. Make payment for work specified in the foregoing at no additional cost to the Owner if, in the opinion of the Consultant, such work could have been reasonably foreseen by examination at time of tendering and which has been caused by lack of proper care and protection.
- 6.4. Unless otherwise specified, restore services on which work is performed to original condition.
- 6.5. This Contract requires that the Contractor cooperate and work with the Owner's Landlord and other organizations, including telecommunication and data providers, and similar, to arrange for the extension or alteration of existing systems where indicated in the Contract.
- 6.6. Provide modifications or make connections to existing services that require shut-down of main building services only outside of Facility Operating Hours, and only upon written approval of the Owner and Building Landlord.

011090 ABBREVIATIONS

1. USAGE OF ABBREVIATIONS

- 1.1. Many words or expressions that are repeated frequently on the drawings are abbreviated to reduce the amount of wording that might obscure the detailing. Refer to the Drawings and Specifications for abbreviations used in the documents. Where misinterpretation of abbreviations occurs, interpretation of the meaning of these abbreviations shall be by the Consultant.

012010 SCHEDULE OF VALUES

1. GENERAL

- 1.1. The breakdown of the Contract Price submitted by the Contractor at time of bidding and subsequent contract agreement shall form the basis for the schedule of values.
- 1.2. No progress payment may be claimed by the Contractor nor shall any payment be due the Contractor in the absence of a formal schedule of values that has been accepted by the Consultant and Owner. In the absence of such agreed and accepted breakdown of the Contract Price the Consultant may, at its discretion, impose a schedule of values in accordance with this Section, acting reasonably and without favour to either party in the Contract.
- 1.3. Contractor is solely responsible for ensuring that each of the Contractor's Subcontractors and Suppliers provides detailed information and such evidence as the Consultant may reasonably require or direct in order to arrive at an accepted schedule of values. This information may include, but not be limited to, copies of purchase orders and invoices for aspects of the Work. No "privity of contract" or similar claim shall be made by either Contractor or Supplier or Subcontractor as reason for not furnishing accurate information regarding the monetary value of any aspect of the Work.

2. SCHEDULE OF VALUES

- 2.1. Refer to CCDC 2 - 2020, GC 5.2 as modified by the Supplementary Conditions and as amplified and clarified by this Section.
- 2.2. Costs of temporary facilities and utilities shall be amortised over the duration of the Work. Claims for 'mobilization', 'bidding costs' or similar lump sums at or before start of work are not acceptable.
- 2.3. The items identified in the submitted Additional Bid Information which shall form the preliminary basis for the schedule of values, but shall further include or be modified for separate line items for the following parts of the Work:
 - The Cost of Deliverables (for example, project meetings);
 - Field Engineering and Layout by the General Contractor;
 - Final Cleaning by a professional cleaning service;
 - Facility Manuals Work by the General Contractor;
 - As-Built Documentation Work by the General Contractor;
 - Project Close-out documentation by the General Contractor;
 - Value Added Tax.
- 2.4. The sum for each item in the Schedule of Values shall be deemed to include the following deliverables and shall have an independent and identified value for each:
 - the cost of Submittals (not to be more than 5% of the line item);
 - the cost of all Mark-ups (including Contractor, Trade Contractor & Supplier Markup);
 - the cost of Product and material Supply;
 - the cost of Installation;
 - the cost of Commissioning, testing, adjusting, balancing, verification & reporting of same; and
 - the cost of project Close-out documentation (not to be less than 3% of the line item).
- 2.5. The Contractor is hereby cautioned that all related services required by the Contract Documents for performance of the Work have monetary value that shall be identified in the Schedule of Values. No claim for payment shall be certified for related services not performed.

3. ASSET MANAGEMENT TRACKING

- 3.1. This Contract requires that the Contractor provide the complete breakdown of the Contract Amount into the Owner's Uniformat II division of assets, for the Owner's use. Owner will provide format and spreadsheet in Excel or equivalent. Pay all costs for this work.

012020 CASH AND CONTINGENCY ALLOWANCES

1. GENERAL REQUIREMENTS

- 1.1. All allowances shall be carried by the Contractor and not by individual subcontractors. Contractor shall examine documents prior to bidding and shall include in their Price all allowances called for in the documents. If allowances specified herein are repeated elsewhere, or if allowances are specified elsewhere but not listed in this Section, Contractor is requested to inform Consultant immediately in order that action may be commenced to implement the express intent that all allowances be carried by the Contractor.
- 1.2. Disbursements from allowances shall be authorized by the Consultant in writing.
- 1.3. Unexpended amounts of Cash Allowances may be reallocated to other specified Cash Allowances at the sole discretion of the Owner.
- 1.4. Unexpended amounts of Cash Allowances shall be deducted from the Contract Price at completion of Work, in accordance with the General Conditions as amended by the Supplementary Conditions.
- 1.5. No refund of mark-up will be expected from the Contractor if actual expenditure against specific purpose Cash Allowances is less than aggregate total of such allowances.
- 1.6. The maximum percentage mark-up on any authorized overrun of aggregate total amount of all specified allowances shall be as per the General Conditions as modified by the Supplementary Conditions.
- 1.7. Allowances include all taxes except HST, as calculated on net total only.
- 1.8. The Consultant may direct the contractor to obtain tenders, at no additional cost to the Owner, for work for which payment is made from allowances, and to enter into subcontract agreements for such work at such amounts as obtained by the tendering process. Choice of bidder is at Owner's sole discretion.

2. CASH ALLOWANCES

- 2.1. Cash allowances, unless otherwise specified, cover the net cost to the Contractor of services, products, installation (except in the case of material supply allowances), construction machinery and equipment, freight, handling, unloading, storage, and other expenses incurred in providing specified allowance work.
- 2.2. Cash allowance shall be expended only upon the authority of the Owner, and in accordance with Owner's instructions
- 2.3. The Contract Price, and not the Cash Allowance, includes the Contractor's overhead and profit in connection with such cash allowances. All Division 1 responsibilities are included under overhead, by definition.

- 2.4. Progress payments on accounts of work authorized under Cash Allowances shall be included in the Contractor's monthly claim for payment, and Consultant's monthly certificate for payment.
- 2.5. A schedule shall be prepared by the Contractor to show when items called for under Cash Allowances must be authorized by the Owner for ordering purposes so that the progress of the Work will not be delayed. No claim for delay on this basis shall be valid if the Contractor has failed to comply with this requirement.
- 2.6. Cash Allowances are paid only on the basis of copies of invoices submitted to the Contractor which are due for payment within 32 (thirty-two) days of the date of Contractor's monthly claim, and for Allowance items provided in a manner consistent with the Contractor's Construction Schedule for the provision of such items.
- 2.7. Include in the Stipulated Price Tender, the amount of each following allowance, for Work specified in the respective specification divisions or sections, or on Drawings or Schedules. Note that Division 1 requirements are not by Allowance, but are carried elsewhere in the Contract Amount.

1. The sum of forty-five thousand dollars (\$45,000 CDN, excluding HST) for

1. the material supply of door hardware that is specifically noted on drawings and/or specifications for supply by Material Cash Allowance. Note that all hardware not identified as supply by allowance shall be supplied and installed as part of the Work and the cost of this hardware is not in the Cash Allowance. Installation of all hardware is part of the Work and is not covered by the Cash Allowance.
2. supply of miscellaneous signage or accessories. The cost of installation is included in the contract, but not in the allowance.
3. for 3rd party witnessing of Commissioning of Systems, by a firm selected by the Owner and reporting to the Owner regarding the performance of Contract commissioning requirements. The Cost of performing all commissioning activities is by the Contractor and not the Owner's Commissioner, and is not included in the Cash Allowance.
4. For replacement of existing piping, fitting, and support components of the Sanitary System by the Plumbing Trade Contractor, to an extent to be determined upon completion of select demolition of ceilings.

3. CONTINGENCY ALLOWANCE

- 3.1. Expend Contingency Allowance only on Consultant's written instructions.
- 3.2. Do not include in the Stipulated Sum charges for Contractor's overhead and profit on expenditures from Contingency Allowance. Add such charges to the net cost of each expenditure from Contingency Allowance at the percentage rate established by the Supplementary Conditions for Changes in the Work, or agreed to by the Owner otherwise, all in accordance with the General Conditions of the Contract as amended by the Supplementary Conditions.
- 3.3. Include in each expenditure from the Contingency Allowance applicable taxes specified in the General Conditions of the Contract and the completed Tender Forms.
- 3.4. Credit trade discounts to the Owner, except do not credit cash discounts given to the Contractor for payments to accounts before net due dates.
- 3.5. Deduct all expenditures from Contingency Allowance on succeeding applications for payment, as instructed in writing by the Consultant for each expenditure, until the Allowance is expended or before Contract Price is finally adjusted to remove unexpended portion from the Contract Amount.
- 3.6. **Include in the Stipulated Price Tender a Contingency Allowance in the amount of fifty thousand dollars (\$50,000 CDN, excluding HST).**

012030 PAYMENTS

1. GENERAL REQUIREMENTS

1. All submissions under this section shall bear the project name, Owner's name and Project No., Consultant Project No., and date.
2. Contractor shall submit monthly progress invoices. Invoices shall be dated last day of each month. Submit final invoice within 60 days of Completion of Contract as defined in applicable lien legislation and as modified by this Contract's provisions. Failure to submit invoices within schedule and in correct amounts and formats voids Owner's obligations to pay invoices in a timely manner.
3. Where a Certificate of Clearance from the Workplace Safety and Insurance Board (WSIB) is requested, the Certificate submitted shall clearly show that the Contractor is in good standing with the WSIB. WSIB "independent operator" status for any Contractor, Subcontractor, or Supplier is not acceptable.
4. Contractor is solely responsible for ensuring that each of the Contractor's personnel, including but not limited to employees, directors, officers, principals and executives of the Contractor, are covered by WSIB insurance.
5. Contractor warrants and certifies to the Owner that each of the Contractor's personnel, including but not limited to employees, directors, officers, principals and executives of the Contractor, are covered by WSIB insurance under specific and appropriate categories for the Contractor's operations as determined by WSIB.
6. Contractor shall defend, indemnify and hold harmless the Owner against any and all claims made due to failure to pay WSIB premiums or provide appropriate WSIB coverage for any person or firm engaged by the Contractor, directly or indirectly, for Work of this Contract.
7. Obtain a valid WSIB Certificate of Clearance from each Subcontractor or Supplier prior to releasing payment to the Subcontractor or Supplier. Indemnify and hold harmless the Owner against any failure of the Contractor to obtain valid Subcontractor's or Supplier's WSIB Certificate of Clearance prior to releasing payment to respective Subcontractor or Supplier.
8. All applications for payment after the first shall be accompanied by CCDC Statutory Declaration 9A, duly executed as a sworn statement under oath. CCDC Statutory Declaration 9A is acceptable only where it bears an original CCDC Statutory Declaration 9A copyright seal.
9. Contractor shall submit monthly progress invoices. Invoices shall be dated last day of each month. Submit final invoice within 60 days of Completion of Contract as defined in applicable lien legislation and as modified by this Contract's provisions. Failure to submit invoices within schedule and in correct amounts and formats voids Owner's obligations to pay invoices in a timely manner.
10. Requirements for Schedule of Values and Pricing of Changes are described in Section 012010 and 012040 respectively. Conform strictly to such requirements and additionally note that General Conditions and Supplemental Conditions govern the claim for payment and payment processes.
11. The Contractor is cautioned that there are a number of instances and circumstances as described within the Contract Documents where failure to perform certain contract requirements prior to milestones or deadlines, and in case of certain circumstances or actions, neither the Consultant nor Owner are required to evaluate or process any claim for payment.

2. PROGRESS APPLICATIONS

- 2.1. All applications for payment shall be accompanied by a Certificate of Clearance from the Workplace Safety and Insurance Board (WSIB), clearly showing that the Contractor is in good standing
- 2.2. All applications for payment after the first shall be accompanied by CCDC Statutory Declaration 9A, duly executed. CCDC Statutory Declaration 9A is acceptable only where it bears an original CCDC Statutory Declaration 9A copyright seal.
- 2.3. Submit monthly progress invoices. Invoices shall be dated last day of each month. Submit final invoice within 45 days of Completion of Contract as defined in applicable lien legislation and this Contract. Failure to submit invoices within schedule voids Owner's obligations to pay invoices.
- 2.4. Submit a progress based upon the Consultant approved Schedule of Values.
- 2.5. All applications for payment shall include a summary of changes, showing values complete.
- 2.6. No payment will be made for Products ordered or manufactured, but not yet delivered to the Place of the Work, or for Products delivered to the Place of the Work but not scheduled for installation within two weeks of delivery. Products delivered to the Place of the Work are the property of the Owner and shall not be removed without the Owner's consent, except where rejected as defective products or removed as legitimate debris. All Products delivered and/or installed to the Place of the Work shall remain at the risk of the contractor notwithstanding that title has passed to the Owner.
- 2.7. Progress applications claiming monies against cash allowances shall be accompanied by true copies of all invoices from suppliers or subcontractors furnishing products, etc., purchased under a cash allowance.
- 2.8. **No applications for payment for progress shall be reviewed, nor any payment certified, between the Application for Substantial Performance and Final Payment for Completion of Contract.**

3. APPLICATIONS FOR A CERTIFICATE OF SUBSTANTIAL PERFORMANCE

- 3.1. Applications for a Certificate of Substantial Performance, release of holdback, and Statement of Completion shall be completed in accordance with OAA/OGCA Document 100 Takeover Procedures (latest edition). In Document 100, substitute "Consultant" for "Architect", and "review" for inspection where it appears in relation to the Consultant's assessment of the Work.
- 3.2. The Contractor shall make written application to the Consultant for the certificate.
- 3.3. In addition to the requirements for Progress application, the application shall also include:
 1. statements that the contract is substantially performed as defined in the Contract, and including a calculation confirming that remaining contract amounts are not more than the percentages of amounts outlined in the Construction Act and meeting requirements of the Contract;
 2. a statement that all required submissions have been made;
 3. statements of completion with a cost value for deficiencies, outstanding documentation, work that can not be performed and which is beyond the Contractor's control, and any work which is to be completed at a later date as agreed to by the Owner;
 4. any set-offs agreed with Owner for value of work that shall be performed after Substantial Performance and that is proposed not for inclusion in the calculation of remaining work of the Contract; and
 5. a separate accounting showing the amount of holdback that shall be released from holdback provisions upon expiry of the period for liens, subject to Contract provisions for payments.

- 3.4. If the Consultant finds the application to be complete, the Consultant will visit the Place of the Work to verify the validity of the application.
- 3.5. If the application is accepted by the Consultant, the Consultant will issue a certificate of Substantial Performance to the Owner and to the Contractor.

4. RELEASE OF HOLDBACK

- 4.1. Holdback monies will be released in accordance with Contract provisions and applicable legislation except that Owner may withhold sufficient funds to protect themselves from loss on account of any of the following:
 1. Defective work not remedied.
 2. Delay in performance of the work.
 3. Delay in submission of documentation.
 4. Claims filed or reasonable evidence indicating probable filing of claims.
 5. Overpayment for completed work.
 6. Damaged work caused by Contractor, Subcontractors or Suppliers.
- 4.2. A Certificate for Payment of substantial performance holdback will only be made upon receipt by the Consultant of proof of publication of the Certificate of Substantial Performance from the publishing newspaper (Daily Commercial News) or equivalent accepted trade advertisement method meeting the requirements of legislation.
- 4.3. Where the Contractor does not publish the Certificate of Substantial Performance within 10 calendar days of the Consultant's issuance of the Certificate, the Owner may, at the Owner's sole discretion, publish the Certificate of Substantial Performance, deducting the cost of the publication from the Contract Price. Cost of publication will include the advertising fees, plus Owner's and Consultant's labour costs charged at regular hourly rates for time involved in arranging publication. Where there are no regular hourly rates, costs shall be charged at hourly salary or wages multiplied by 3.

5. FINAL PAYMENT

- 5.1. When all deficiencies have been corrected and the work completed, the Contractor may request that the Consultant visit the Place of the Work for a further review.
- 5.2. Upon being satisfied that all deficiencies have been corrected and that all other conditions listed under this Section above have been satisfied, all to the satisfaction of the Owner, the Consultant will so inform both the Contractor and the Owner.
- 5.3. Upon receipt of the Contractor's invoice, the Consultant will issue a certificate for final payment.
- 5.4. If a subsequent site review(s) is (are) required to verify 100% completion of deficiencies, the Contractor will be expected to compensate the Owner, by way of a change order to the Contract, for the time and travel expenses incurred by the Consultant for any subsequent review(s). The rates for time and travel are outlined in an agreement between the Consultant and the Owner.
- 5.5. If the deficiencies are not completed within a reasonable period of time, as agreed to by all parties, the Owner may invoke the requirements of CCDC2-2020, GC 7.1 - Owners Right to Perform Work, Terminate the Contractor's Right to Continue with the Work or Terminate the Contract.

6. TAX RECOVERY

- 6.1. When an exemption or recovery of government sales taxes, duties or excise taxes is applicable to the Contract, the Contractor shall at the request of the Owner assist, join in, or make application for an exemption, recovery or refund of all such taxes and duties. All amounts recovered or exemptions obtained shall be for the sole benefit of the Owner. The Contractor agrees to endorse over to the Owner any cheques received from the federal or provincial governments as may be required to implement the foregoing failing which the Owner is authorized to deduct the amount from any Contract payment that is then or may thereafter become due to the Contractor.
- 6.2. Maintain accurate records, tabulating equipment and component costs showing all respective taxes and duties or excise taxes. At the request of the Owner, assist, join in, or at Owner's expense, make application on behalf of the Owner for any exemption, recovery or refund, and provide the Owner with copies, or where required originals of records, invoices, purchase orders or other documentation as may be necessary to support such application.

7. APPLICATION FOR CERTIFICATION OF COMPLETION OF A SUBCONTRACT OR EARLY RELEASE OF HOLDBACK

- 7.1. Determination of completion of a subcontract will not be made, nor will there be early release of holdbacks for any reason.

012040 VALUATION OF CHANGES

1. GENERAL

- 1.1. No industry practice, norm, or standard practice by the Contractor or any Subcontractor or Supplier shall take precedence over methodology and resultant pricing for changes in the Work than that described by the Contract Documents. The Contractor, having executed the Contract, is deemed to accept the methodology and governing conditions for valuations as set out in the Contract Documents.
- 1.2. The Contractor is cautioned that in accordance with General Condition GC3.7.1 of the Contract, as modified by the Supplemental Conditions, the Contractor shall bind all Subcontractors and Suppliers to the terms and conditions of the Contract in its entirety and without exception.
- 1.3. The Contractor is cautioned that the words Markup and Overhead are defined terms in the Contract.

2. FIELD/SITE INSTRUCTIONS AND SUPPLEMENTAL INSTRUCTIONS

- 2.1. Field Instructions, Site Instructions and/or Supplemental Instructions (hereinafter called Supplemental Instructions) are issued only for the purpose of recording any clarifications or interpretation of the Contract Documents or giving direction on field conditions. These instructions are subject to the provisions of the Contract Documents and unless stated herein and specifically co-authorized by the Owner, do not affect the Contract Price or Contract Time.
- 2.2. If in the opinion of the Contractor a Supplemental Instruction involves an increase in the Contract Price or Contract Time, the Contractor shall within 7 working days of receipt of the Supplemental Instruction advise the Consultant in writing accordingly, c/w an itemized proposal. Failure to provide written notification within time stipulated shall be deemed acceptance of Supplemental Instruction by the Contractor without any increase to the Contract Price or Contract Time.

- 2.3. Where the Contractor requests a change in Contract Time or Contract Price because of the provisions of a Supplemental Instruction, the Contractor shall not proceed with any work of the Supplemental Instruction until so directed by the Owner. If the Owner accepts the proposal, the Supplemental Instructions will be issued as a Change Order.
- 2.4. Where, in the reasonable opinion of the Consultant or the Owner, the Supplemental Instruction involves a decrease in the Contract Price or Contract Time, the Consultant or the Owner through the Consultant shall advise the Contractor of such opinion, including the details of the proposed adjustment, in writing prior to the final payment being made. The Contractor shall provide satisfactory evidence that an adjustment is not warranted, failing which the Owner shall proceed to deduct the applicable amount from final payment or adjust the Contract Time, as the case may be. Where, in the opinion of the Consultant or the Owner after having reviewed the Contractor's evidence regarding adjustment, the Consultant deems that the Supplemental Instruction warrants a decrease in Contract Time or Contract Price, the Consultant or the Owner through the Consultant shall so advise the Contractor and the matter shall be resolved in accordance with the Contract provisions for dispute, prior to release of final payment.

3. VALUATION OF CHANGES IN THE WORK

- 3.1. The Contractor shall provide the Consultant with a detailed cost analysis of contemplated change that is in conformance with the requirements of this Section and the General and Supplemental Conditions of the Contract, indicating:
 1. quantity of each material;
 2. unit cost of each material;
 3. time involved;
 4. subtrade quotations including a complete analysis of costs.;
 5. cost of changes to bonding requirements;
 6. markups, if applicable;
 7. value of Value Added Tax as applicable; and
 8. any proposed change in Contract Time, accompanied by a clear analysis of the position of work related to the change on the critical path for achievement of Contract Time as set out in the accepted Construction Schedule. No change to Contract Time shall be allowed where the Consultant does not reasonably accept that such change to contract requirement has effect on the critical path shown on the Construction Schedule. Where the Construction Schedule fails to adequately identify critical path, it shall be deemed that there is no change to Contract Time from any proposed change in the Work.
- 3.2. When the change or revision involves deleted work as well as additional work, the cost of the deleted work is to be subtracted from the cost of the additional work before allowable Markup percentages are applied to the resultant total, at each stage of Subcontractor / Supplier pricing and Contractor pricing.
- 3.3. Material costs are not to exceed those published in local price guides and available to the Owner through normal direct purchase, as determined by the Consultant.
- 3.4. Labour unit costs in relation to material and Products to be installed as part of the work described by the Mechanical Divisions and Utilities Divisions of the specification are to be in accordance with the Mechanical Contractors Association of America (MCAA) Labor Estimating Manual, latest published version, at base rates and without inclusion for inefficiencies or job conditions unless with the consent of the Consultant, less 25%.
- 3.5. Labour unit costs in relation to material and Products to be installed as part of the work described by the Electrical Divisions and Utilities Divisions of the specification are to be in accordance with the National Electrical Contractors Association (NECA) Manual of Labor Units, latest published version, at base rates and without inclusion for inefficiencies or job conditions unless with the consent of the Consultant, less 25%.

- 3.6. The following shall not be included in the cost of the change to the work, but are covered by the Subcontractor's and Contractor's Markups respectively:
1. The Contractor's head & site office expenses, including stationary, postage, and office supplies;
 2. The costs of the Contractor's Project Manager and administrative personnel of any kind;
 3. Use of temporary offices, sheds, small tools, etc., including the cost of utilities used therein;
 4. Transportation and overnight room expenses for out of town labour;
 5. Insurance premiums;
 6. Licenses and permits, except when these are special for a particular item of work;
 7. Printing charges for Proposed Changes, Change Orders and Drawings for Contractor and Trade Contractors' use in the work. Consultant will only provide electronic PDF copies;
 8. The cost of record drawings and shop drawings, submittals, or warranties;
 9. The cost of clean up and disposal of waste material;
 10. The cost of supervision and management;
 11. The cost of commissioning of the related Building System or Systems;
 12. The cost of rolling stock, trucks, trailers, or other Construction Equipment except as directly used in the installation of the material or Product;
 13. The cost of estimating or response to Consultant requests for documentation or clarification;
 14. Cost of surety, unless total surety for the Contract exceeds 10% of initial Contract Amount; and
 15. Profit or anticipated profit.
- 3.7. The Contractor shall not be entitled to any additional compensation arising out of changes to the Work other than the amounts determined and agreed to under CCDC2-2020 GC 6.2 and in accordance with this Section.
- 3.8. The maximum percentage fee for markups shall be as stated below.

4. PERMITTED MARK-UPS

- 4.1. The maximum net overhead and profit (mark-ups, as defined by the Documents and General Conditions and Supplementary Conditions) shall be in accordance with the Supplementary Conditions, for both Change Orders and Change Directives.

013010 PROJECT MEETINGS

1. ADMINISTRATIVE

- 1.1. Schedule and administer project meetings throughout the progress of the Work at times and locations requested by the Consultant. Distribute written notice of each meeting four days in advance of meeting date to Consultant, Engineers and Owner. Confirm location and inform all participants. Prepare agenda for meetings.
- 1.2. The Consultant presides at meetings.
- 1.3. Record the proceedings for all meetings except the Preconstruction meeting. Submit proceedings to Consultant and Owner in draft form for review prior to distribution. Make such changes as directed by Consultant and Owner. Distribute copies of revised proceedings within three days after receipt of review to all meeting participants and affected parties not in attendance.
- 1.4. Representative of Contractor attending meetings is qualified and authorised to act on behalf of the Contractor. Subcontractors and suppliers do not attend meetings unless authorised by the Owner.

2. REQUIRED MEETINGS

- 2.1. The Contractor shall request a *Pre-Construction Meeting* within 5 days after award of Contract, of parties in contract, to discuss and resolve administrative procedures and responsibilities.
- 2.2. The Contractor shall schedule *Progress Meetings* during course of Work prior to project completion, as directed by the Consultant. Agenda to include the following:
 1. Review and approval of proceedings of previous meeting
 2. Review of items arising from proceedings
 3. Review of Site Safety & Security
 4. Review of Work progress since previous meeting
 5. Review of Contractor's achievement of Contract Time as per the Construction Schedule, corrective measures and procedures to regain projected schedule, and any proposed revisions to Construction Schedule as necessary to achieve the Contract Time
 6. Review of off-site fabrication delivery schedules
 7. Review of Submittals, and any requests for expedited review
 8. Maintenance of quality standards and review of inspections
 9. Review of proposed changes, pending changes, and change orders
 10. Review of Building Systems status, for each Building System
 11. Review of status of as-built documents
 12. Review of Commissioning activities and requirements
 13. Other business.
- 2.3. The Contractor shall schedule *Building Systems Workshops and Commissioning Meetings*, throughout the course of Work, as directed by the Consultant. Building Systems workshops shall take place at project start, and as appropriate to the Interim Milestones for Submittals and commencement of onsite work. Commissioning meetings shall be scheduled monthly, and shall correspond with either the beginning or end of the regularly scheduled construction progress meetings. Meetings shall be attended by all relevant Systems Commissioners as determined by the Consultant.
- 2.4. The Contractor shall schedule a *Pre-Takeover Meeting* prior to application for Substantial Completion.
- 2.5. The Contractor shall schedule a *Post-Construction Meeting* prior to application for final payment. Four days prior to date for meeting, Consultant confirms date for meeting based on evaluation of

requirements for finishing the Work.

013020 CONSTRUCTION SCHEDULES

1. CONTRACT TIME

- 1.1. The Contractor schedules all Work in strict co-ordination with the Owner and the Owner's requirements for access and enjoyment of the site and its surrounding areas, and to meet the requirements of the Contract Time. All costs for achieving the required date for Substantial Performance are hereby included in the Contract Price, including out-of hours and weekend work.
- 1.2. Construction Sequencing is proposed by the Contractor to the requirements of the Contract, and is the Contractor's sole responsibility. The particular sequence anticipated by the design and Owner has been indicated on the Drawings as a minimum requirement. Further design of the ways and means by which the Work is accomplished in accordance with the Contract Sequencing requirements is the Contractor's responsibility. Include all costs for organising the Work to achieve these requirements.
- 1.3. The Contractor shall effectively schedule the Work for minimum disruption and to achieve:
 1. Contractor may take possession of the Phase 1 Planning Area to begin onsite operations on July 1, 2025
 2. By August 29, 2025, achieve Occupancy (as set out in the Ontario Building Code) and turnover of the Phase 1 Planning area to the Owner;
 3. Contractor may take possession of the Phase 2 Area to begin onsite operations on September 22, 2025.
 4. By December 19, 2025, achieve Substantial Completion of the Work, as defined in the Contract. This includes all portions of the Work completed, Ready for Use to suit the operational needs of Owner, by the Owner's sole judgement Occupancy (as set out in the Ontario Building Code) and turnover of the Remaining areas to the Owner;
 3. By end of day on Friday, August 29, 2025, Substantial Completion of the Work , as defined in the Contract. This includes all portions of the Work completed, Ready for Use to suit the operational needs of Owner, by the Owner's sole judgement and criteria; and
 4. Achieve Completion of the Contract, as defined in the Contract Documents, within 45 (forty-five) days of Substantial Completion of the Work, on January 31, 2026.
- 1.4. Additionally, the Contractor shall effectively schedule the Work to achieve the following Interim Milestones deadlines:
 1. Achieve Owner's acceptance of the Contractor's proposed Construction Schedule, by 30 (thirty) days hence from the date of notice of Contract Award; and
 2. Achieve Consultant's acceptance of all Product Shop Drawing submissions for the Work, by 60 (sixty) days hence from the date of notice of Contract Award.
- 1.5. The Contractor shall schedule portions of the Work, where indicated by the Documents for specific time frames or periods, within those periods. Where accomplishment of the Work within specified time frames requires weekend, holiday, off-hours, extra shifting, and overtime, include the cost of such scheduling and approach to the Work in the Contract Price. The Contractor and all Trade Contractors shall be bound by this condition. The Owner will not accept any additional cost for required organisation of the Work to meet specified time frames for its aspects, including but not limited to costs for multiple visits by the Contractor and/or trade contractors.
- 1.6. *Construction Schedule* means the particular sequencing and performance of all aspects of the Work that achieves *Substantial Performance* of the Work within the *Contract Time* and *Completion of the Contract* to the agreed date stated in the *Contract*. The Contractor shall provide a clear and coherent document that illustrates the *Construction Schedule* pursuant to GC3.5 and as elsewhere required in

the *Contract Documents*, that demonstrates how such achievement will be attained to the complete and full satisfaction of the *Owner* and *Consultant*. No alteration of the *Construction Schedule* shall alter the requirements for Substantial Performance of the Work within the *Contract Time*. Any alteration of the *Construction Schedule* that fails to demonstrate *Substantial Performance of the Work* within the *Contract Time* shall not be permitted nor shall be valid to govern the performance of the Work without the written consent of the *Owner* in each instance.

2. SCHEDULES REQUIRED

2.1. Submit the following schedules as per the requirements of this Section:

1. *Submittals Schedule*: include all submittals required under the Contract, including shop drawings, tests, and samples. Indicate dates for submitting, review time, resubmission time, float time, last date for meeting Proposed Product Delivery Schedule.
2. *Product Delivery Schedule*: include dates for delivery of all equipment, finish items, and factory-finished manufactured items. Show last dates for order, shipment & delivery to meet Schedule.
3. *Cash Flow Schedule* with the first application for payment as an estimated breakdown of contract price by claim period.
4. *Warranty Expiration Schedule* with application for final payment showing expiration dates for all warranties associated with the Work.
5. *Construction Progress Schedule* that shall include the complete sequence of construction activities:
 1. Relate Schedule to Owner's requirements for use and enjoyment of the building and site, and to required milestones for completion of the Work in whole or in part. Show work to occupied and unoccupied areas, including milestones for beginning and end of operations separately. Show relations to other schedules for Product Delivery and Submittals.
 2. Show clearly through graphic diagrams accompanying schedules the approach to construction operations on the site and to existing buildings and portions thereof.
 3. Include in the Schedule the dates for the commencement and completion of each major element of construction and clearly track the proposed progress of building systems, including but not limited to the following:
 4. Show projected percentage of completion for each item as of the first day of each week.
 5. For succeeding submissions at each application for payment, indicate progress of each activity to date of submission of schedule.
 6. Show changes occurring since previous submission of Schedule including major changes in scope, activities modified since previous submission, revised projections of progress and completion, and any other identifiable changes.
 7. Provide a narrative report to define problem areas, anticipated delays, and the impact on the Schedule, and corrective action(s) recommended and its effect.

2.2. Submit initial schedules to Consultant within 10 (ten) days after Notice of Award of Contract, and:

1. Distribute copies of the schedules to all concerned parties except Consultant and Owner before final submission for review. Instruct recipients to report to the Contractor, within 3 (three) calendar days, any problems anticipated by the timetable shown in the schedule to be reviewed. Upon completion of review by recipients, make necessary changes to schedule to incorporate and resolve concerns and conflicts. Submit to Consultant for review.
2. Consultant will review schedules and return reviewed copy within 5 (five) days after receipt.
3. Resubmit schedule showing resolution of concerns, conflicts & detail per Consultant's review.

2.3. Resubmit revised and finalized schedules prior to applying for any payment claim. These schedules shall form part of the Contract.

- 2.4. Schedules shall show critical path, identify decisions and approvals, and shall include reasonable time for Owner and Consultant submittal review and float time. Identify all elements likely to affect product development, manufacture and delivery, installation and curing.
- 2.5. Schedules shall be in the form of a horizontal bar chart, showing critical path, with a separate bar for each trade or operation and horizontal time scale identifying the first working day of each week.
- 2.6. Site Super shall submit weekly narrative report of previous week's progress and upcoming Work.

013030 SUBMITTALS

1. DEFINITIONS

- 1.1. *Shop Drawings*: as defined in CCDC2-2020 and as amended by the Supplementary Conditions. The Contractor is cautioned that the term Shop Drawing includes many forms of submittal as necessary or requested by the documents or reasonably requested by the Consultant. Shop drawings are prepared by the Contractor to illustrate the achievement of parts of the Work, including the ways and means for such achievement. They include all items requested and required by the Contract for preparation, design, and delivery by the Contractor to the Consultant and/or Owner.
- 1.2. *Submittals and/or Submissions* means shop drawings.
- 1.3. *Achievement of Contract Requirements for Submittals* means that the Consultant has returned to the Contractor all required Submittals in the Contract (excepting only end of contract submissions and progress payment submissions) as accepted by the Owner and Consultant. This contract requires that the Contractor achieve such Interim Milestone in accordance with the terms and conditions of the Contract. See Section 013020.

2. GENERAL

- 2.1. This section specifies general requirements and procedures for submittal of shop drawings, product data, testing results, samples and mock-ups to the Consultant for review, in conjunction with the submissions of a Tender Form and related documentation, and following award of a Contract. Additional specific requirements for submissions are specified elsewhere in the Contract Documents.
- 2.2. Submittals shall provide and show Contractor's design of product and material components of the Work sufficient to ensure that the submitted item accomplishes the design intent of the building systems of which it forms a whole or part. Include all costs for this design work and be responsible for it. Where design is to be undertaken by professionals, provide such work and evidence of professional designer's ability to offer such services in Ontario, and designer's liability insurance against errors and omissions. Pay all costs for this work and services.

3. SUBMISSION PROCEDURES

- 3.1. Do not proceed with manufacturing work until relevant submissions are reviewed and accepted by the Consultant.
- 3.2. Present shop drawings, product data, samples and mock-ups in same units as Contract Drawings. Where items or information is not produced in imperial units converted values are acceptable.
- 3.3. Contractor's responsibility for errors and omissions in submission is not relieved by the Consultant's review of submissions.
- 3.4. Notify Consultant, in writing at time of submission, identifying deviations from requirements of

Contract Documents stating reasons for deviations. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Consultant's review of submission, unless the Consultant gives written acceptance of specific deviations.

- 3.5. Make any changes in submissions which the Consultant may require consistent with Contract Documents and resubmit as directed by Consultant.
- 3.6. Notify Consultant, in writing, when resubmitting, of any revisions other than those requested by Consultant.

4. SUBMISSION REQUIREMENTS

4.1. General

1. Co-ordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
2. Allow 14 (fourteen) days for Consultant's review of each submission.
3. Accompany submissions with the submittal transmittal letter appended to this Division.
4. Each submission shall bear the Subcontractor's and Contractor's stamps, signed by in each case by the Contractor's Commissioning Co-ordinator, Contractor's authorized representative, and Trade Contractors' Systems Commissioner to which the submittal may pertain, specifically certifying and stating the following: approval of submittal, verification of co-ordination with existing conditions, verification of compliance with design intent and performance of building system and co-ordination with other components of the building system, and compliance with Contract Documents.
5. Submittals must be reviewed and accepted by all Suppliers and Subcontractors in the supply chain and/or affected by the aspect of the Work to which the Submittal relates. The submitted document must bear all required reviews and acknowledgements within one document file.
6. Submission of submittals through hyperlinks or manufacturer web-based processes is not acceptable. Only electronic, searchable, PDF copy of submissions shall be considered valid, as submitted by electronic mail to the Consultant. Scans of hard copy are not permissible as submittals.
7. The Consultant will not print submittals on behalf of the Contractor or for review of submittals. The responsibility for ensuring receipt of the complete and reviewed submittal to the Consultant rests fully with the Contractor. The Consultant will not review submissions through ProCore or other similar Contractor project management tools, aids or software.
8. Cross-reference all submissions to applicable portions of Contract Documents.

4.2. Shop Drawings

1. Shop Drawings shall be original drawings, or modified standard drawings provided by Contractor, to illustrate details of portions of Work, which are specific to project requirements and are prepared in order to govern production work on the shop floor. Catalogue or descriptive sales and marketing literature will not be accepted as shop drawings.
2. Submit shop drawings for complete systems and all accessories proposed for supply under this Contract. Where applicable Submittals shall show: design of detailed components, fastening and securement, and fabrication; layout including dimensions and clearances; compliance with Standards; single line and schematic diagrams; and relationship to adjacent work.

4.3. Product Data

1. Product data shall be Contractors catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.
2. Supplement standard information to provide details applicable to project and design of aspects of the product that have been undertaken to ensure it meets the specification and the intent of the building systems of which it may form part. Provide all information regarding specific alterations and features that are being provided to meet the design intent of the building systems. Delete information not applicable to project.

4.4. Samples

1. Samples are defined as physical examples which fully describe materials, equipment, finishes, and quality of such work and materials. Samples shall include duplicate copies of all finishes and surface materials for this Contract, with specified materials, indicative of quality of work and materials, and complete with any alterations required to meet the requirements of this Contract.
2. Supply all samples to locations acceptable to Owner. Pay all costs for delivery of samples.
3. Reviewed and accepted sample will become standards of quality of work and materials, material, and performance against which installed work will be verified.
4. Where a range of colour, pattern or texture is criterion, submit full range of samples.

4.5. Mockups

1. Provide all Mockups requested in other sections of the specifications and this Division.
2. Mockups do not form part of the finished Work.
3. Additional requests and requirements for Mockups are described in Section 017010 and in individual specification sections.

4.6. Reports

1. Provide all reports, commissioning and building systems reviews and tests and all similar documentation that is requested in the Contract Documents, wherever requested.

4.7. Component Systems Diagrams and Service Room Lay-outs

1. Upon Consultant request, submit component systems diagrams and/or service room layouts verifying routing and mounting of raceways and equipment for systems.

5. REVIEW OF SUBMITTALS, COSTS FOR REVIEW OF REJECTED SUBMISSIONS

- 5.1. The review of submittals by the Owner and/or the Owner's Consultant is for the sole purpose of ascertaining conformance with the general concept and intent of the design of building systems, and as a precaution against error or omission on the part of the Contractor. Neither the Owner nor its Consultant approves the detail design inherent in the shop drawings or submittals, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents. Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated with existing conditions, for information that pertains to fabrication processes or to techniques of construction and installation and for co-ordination of the portions of the Work.
- 5.2. The Consultant reviews submittals once only at Owner's expense. Failure to submit shop drawings in accordance with Contract requirements will result in a finding of defective work under the

General Conditions of the Contract, and the Consultant will re-review any submission that has been rejected at the Contractor's expense as deducted from the Contract Price and paid to the Consultant by the Owner as reimbursement for additional services to the Consultant's contract for services with the Owner.

013050 CO-ORDINATION

1. GENERAL

- 1.1. The Contractor is hereby directed to the definition of *Work* in this Contract. *Work* means the total construction and related services required by the Contract Documents. The related services are deemed to have monetary value within the Contract Amount, and failure to perform such services to a standard required by the Contract shall result in findings of Defective Work and shall not be approved for payment.
- 1.2. The Contractor is hereby directed to the definition of *Building System* in this Contract, and the required work for the co-ordination of each Building System described elsewhere in Division 1.
- 1.3. The word co-ordination is used in the Contract Documents as an abbreviation which refers to all the services required by the Contractor's for control and organization of the Work.
- 1.4. The Contractor shall totally control, shall effectively direct, and shall supervise the Work, and shall ensure conformity with the Contract Documents. The Contractor shall design, execute, and monitor all means, methods, techniques, and procedures with respect to the performance of the Work, and shall co-ordinate the various parts of the Work under the Contract.
- 1.5. The Contractor shall clearly demonstrate to the Consultant and Owner the planning, communications, layout, monitoring, scheduling, and interrelation of the construction and related services that shall achieve the Contract Requirements. The Contractor shall perform the Work in accordance with same.
- 1.6. The Contractor shall bind all Suppliers and Subcontractors to co-ordination requirements described herein, so that the requirements of this Section are the responsibility of particular Suppliers and Subcontractors with respect to aspects of the construction, in equal measure to the Contractor's overall responsibilities for the total construction.

2. LAYOUT OF THE PARTS OF THE CONSTRUCTION

- 2.1. The Contractor shall be responsible for measurement, location, laying-out, determination of levels and positioning of all parts of the construction. The Contractor shall ensure that all Suppliers and Subcontractors co-operate fully in the performance of these tasks, but may not delegate or assign these tasks to any other person or entity save and except a qualified land surveyor licensed to practice at the Place of the Work.
- 2.2. The Contractor is responsible for location and co-ordination of openings, access doors, sleeves and accessories.

3. CO-ORDINATION OF BUILDING SYSTEMS

- 3.1. Unless specifically stated in the Contract, the Contractor, and in particular the supervisor, shall be responsible for the planning, sequencing, control, and co-ordination of all components of specific Building Systems so that Building Systems requirements as described elsewhere in Division 1, including performance in service, are achieved. Where assignment to a Supplier or Subcontractor is specifically stated in the Documents, such Supplier or Subcontractor shall be equally responsible.

- 3.2. The nominated personnel responsible for the planning, sequencing, control, and co-ordination of all components of a specific Building System shall design the execution of the work related to the Building System and co-ordinate such design with other aspects of the Work, including other Building Systems.
- 3.3. The nominated personnel shall review and accept the execution as it progresses, and submit written reports regarding the progress and quality of the execution.
- 3.4. All costs for co-ordination of Building Systems, including troubleshooting and problem resolution services, are included in the Contract Price.

4. SERVICES AND UTILITY SYSTEMS

- 4.1. Consult with utility companies and other authorities having jurisdiction to ascertain the locations of existing services on or adjacent to site.
- 4.2. Information as to the location of existing services, if shown on the Drawings, does not relieve the Contractor of responsibility to determine the exact number and location of existing services.
- 4.3. Give proper notices for new services as may be required. Make arrangements with authorities and utilities for service connections required.
- 4.4. Pay any charges levied by utilities or authorities for work carried out by them in connection with this Contract, unless specified otherwise.
- 4.5. Operate and maintain all utility systems affected by work of this Contract, until the building or specific portions thereof have been accepted by the Owner.
- 4.6. Report existing unknown services encountered during excavation to Consultant for instructions; cut back and cap or plug unused services. Be responsible for the protection of all active services encountered and for repair of such services if damaged.

5. INTERFERENCES

- 5.1. The Contractor, and in particular the supervisor, shall be responsible for co-ordinating the parts of the construction and the sequencing of operations to ensure that portions of the construction are installed in a timely and efficient sequence that minimises interference amongst components of the construction.
- 5.2. Ensure that delivery and placement of items is co-ordinated so that items can be delivered and installed in the best sizes and least number of components without compromise because of access restrictions caused by existing portions of the construction.
- 5.3. Ensure equipment and fixture placing allows for proper accommodation of the item in the space provided, without compromise.
- 5.4. Ensure that accesses and clearance required by jurisdictional authorities and/or for easy maintenance of equipment are provided in the laying out of equipment and services.
- 5.5. Bring any potential concerns regarding interferences to the attention of the Consultant during the Contractor's review of Submissions.
- 5.6. In all cases where the Contractor has any uncertainty regarding means and methods of properly accommodating required elements of the construction, and immediately upon receiving accepted submissions for components of Building Systems affected by such uncertainty, the Contractor shall prepare sequencing and interference co-ordination drawings that clearly describe how the

requirements are to be achieved. Pay all costs for this work, and issue such drawings to all parties involved in the affected work, and to the Consultant.

6. CUTTING AND PATCHING

- 6.1. Perform the total construction and related services so that requirements for cutting and alteration of existing portions of the construction are eliminated wherever possible. Where not possible, perform cutting and patching using trades fully qualified in the installation of the material being cut. Trades installing the item requiring to pass through do not perform the cutting and patching.
- 6.2. In advance of necessary cutting or alteration submit a description of such operations where they may affect: structural integrity of any element of Project, whether new or existing; integrity of weather-exposed or moisture-resistant elements; efficiency, maintenance, or safety of any operational element; visual qualities of sight-exposed elements; or areas adjacent to or beyond identified project sites within the building.
 1. Include in the description identification of project, location and description of work affected, a statement on the necessity for cutting or alteration, a description of proposed work including products to be used, forces to be employed and their qualification to perform the work. Include alternatives to cutting and patching, the proposed date and time work will be executed, and intended methods for reduction of noise and dust generation to achieve minimum disturbance.
- 6.3. Do not proceed with cutting work before receipt of Owner's acceptance of description.
- 6.4. General Requirements for Cutting and Patching:
 1. Execute all cutting and patching, including excavation and fill, required to complete the Work.
 2. Fit the 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 existing elements and new work for penetrations of mechanical and electrical work.
 7. Provide all patching to return existing building elements, including finishes, to conditions determined by Consultant to represent quality standards for finished & exposed work.
- 6.5. Locate existing services prior to cutting operation to determine presence and location of electrical, mechanical, communication, or other services. When cutting slab-on-grade, ensure to locate mechanical piping or electrical conduit that may be within and below slab.
- 6.6. Inspect existing conditions, including elements subject to damage or movement during cutting and patching, or during relocation. After uncovering, inspect conditions affecting quality of the work. Commencement of cutting or patching means acceptance of existing conditions.
- 6.7. Perform all cutting and patching required to install new building components and products whether to integrate with existing building components and products, to integrate with existing site conditions, or to integrate with other new components and products required. Pay for all costs for this work.
- 6.8. In finished areas, conceal pipes ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- 6.9. Consider the location of fixtures, outlets, and mechanical and electrical items indicated as approximate unless otherwise specifically dimensioned or noted. Inform the Consultant of a conflicting installation. Install as directed.

7. COSTS FOR REMEDIAL WORK CAUSED BY FAILURE TO PERFORM

- 7.1. Upon failure to perform the services and execute any aspect of the Work in accordance with the requirements of this Section, make all necessary changes and pay all costs to correct the execution of the Work, including replacements, removals, repairs & making good adjacent construction affected.
- 7.2. Perform the changes, pay the costs, and make good the damage at no additional cost to the Owner.
- 7.3. There shall be no change to the Contract Time for any remedial actions made necessary by failure to perform the Work of this Section.
- 7.4. In lieu of instructions for remedial action, failure to perform the services required by this Section to a standard required by the Contract may result in findings of Defective Work under GC2.4.3. This finding may include a reduction in the Contract Price as determined by the Consultant in accordance with the General Conditions and Supplementary Conditions. The reduction in Contract Price shall include the cost of Consultant re-review and additional services to the Consultant's contract with the Owner.

014020 REFERENCE STANDARDS AND CODES

1. REFERENCE STANDARDS AND CODES

- 1.1. Within the text of the specifications, reference may be made to organizations & standards or norms.
- 1.2. Conform to the recommendations of these organizations for good practice, use standards and codes, in whole or in part, in their most recently revised or amended form, as specifically requested in the Specification and as applicable in normal industry practice to the execution of the Work, to the interrelation of Products and their components, and to the installation of such Products and execution of related services.
- 1.3. If there is question as to whether any Product, installation, or system is in conformance with applicable standards, the Consultant reserves the right to have such products, installations, or systems tested to prove or disprove conformance.
- 1.4. The cost for such testing will be borne by the Owner in the event of conformance with Contract Documents or by the Contractor in the event of non-conformance.

014050 QUALITY CONTROL

1. DEFINITIONS

- 1.1. *Tolerance* means allowable deviation from specific dimensions, criteria and/or sizes which is to be shared and co-ordinated by the Contractor within Building Systems, amongst products, materials and their adjacent components. In general, tolerances shall be in accordance with best recommended practice for each aspect of the Work as determined by referral to Codes and Standards referenced in the Contract Documents, and by referral to written recommendations of Product Suppliers for specific products and materials to be installed in the Work.
- 1.2. *Plumb and/or level*: means plumb or level within 1/8" (3mm) in 10'-0" (3000mm) in any given direction whether along, across, or on any portion of the Work.
- 1.3. *Square* means within 10 seconds greater or lesser than 90 degrees.

- 1.4. *Straight*: means within 1/8" (3mm) of a line described only by start and end point extended on an edge, surface, or plane in any single direction up to 10'-0" (3000mm) in length.

2. GENERAL

- 2.1. Submit name and qualifications of quality control personnel to Owner.
- 2.2. Upon request of Owner submit documentation to verify accuracy of field engineering work.
- 2.3. Submit certification that elevations and locations of completed Work are in conformance with Contract Documents on request of Consultant.
- 2.4. Submit copies of inspection and test reports promptly to the Consultant. Provide copies to Subcontractor of work being inspected/tested.
- 2.5. Tests and Mix Designs
 1. Furnish test results and mix designs as may be requested by the Consultant, and as requested elsewhere in the Contract Documents.
 2. Refusal by a Supplier or Subcontractor to submit mix designs or Product tests for review shall be deemed an acceptance of responsibility by that Supplier or Subcontractor for all aspects of the Work affected by any subsequent failure of the mix or Product in the Work, or for any detrimental effect to other aspects of the Work in the relation of the Product to such aspects.
 3. The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the Law of the Place of Work shall be appraised by the Consultant and may be authorised as recoverable. Testing by the Contractor in accordance with Subcontracts shall be paid by the Contractor.
- 2.6. Building Systems
 1. Submit adjustment and balancing reports for Building Systems, including but not limited to mechanical and electrical systems.
 2. Submit reports of personnel assigned to quality control for specific Building Systems as described elsewhere in Division 1.
- 2.7. Costs of Tests
 1. Contractor pays for all inspection and tests identified in the Contract Documents except those tests and inspections specifically noted for payment under the Testing Allowance. All testing that the Contractor determines as required to satisfy itself that aspects of the work are performed to the requirements of the Contract are undertaken and paid for by the Contractor as an integral part of the Work and are included in the Contract Amount. Owner's testing and inspection through cash allowance is for the Owner's benefit only.

3. REVIEWS AND INSPECTIONS

- 3.1. Refer to GC 2.3.
- 3.2. The Owner and the Consultant shall have access to the Work at all times. If parts of the Work are in preparation at locations other than the Place of the Work, access shall be given to such work whenever it is in progress.

- 3.3. Give timely notice requesting review if Work is designated for special tests, reviews by Consultants, inspections by Inspectors, or review by authorities having jurisdiction.
- 3.4. If the Contractor covers or permits to be covered Work that has been designated for special tests, reviews, inspections or approvals before such is made, uncover such Work, have the inspections or tests satisfactorily completed and make good such Work at no cost to the Owner.
- 3.5. The Consultant may order any part of the Work to be examined if such work is suspected to be not in accordance with the Contract Documents.
- 3.6. The Consultant's general review of the Work is for purposes of informing the Owner of the general progress and quality of the Work. It does not relieve the Contractor of full responsibility for inspection and examination of the Work in whole and in part to ensure compliance with the Contract Documents.
- 3.7. The Contractor brings to the Consultant's attention any part of the Work which does not conform to the requirements of the Contract Documents, and provides such remedial measures, Products and labour required to correct such parts of the Work in order that they meet the requirements of the Contract Documents with no cost to the Owner or Consultant.
- 3.8. The Contractor acknowledges that inspection and supervision form an integral part of the Work, and that failure to fully provide such work constitutes a reduction in the value of the Contract which will result in a commensurate decrease in the Contract Price through a change to the Work in accordance with GC 2.4.3 should the Consultant find that such a decrease is warranted.

3. INDEPENDENT INSPECTION/TESTING FIRMS

- 3.1. Independent Inspection/Testing firms may be engaged by the Owner for the purposes of inspecting and/or testing portions of Work, for the Owner's quality control purposes.
- 3.2. Costs shall be allocated as described elsewhere in Division 1 or, where there is no cash allowance for this item, shall be paid by the Owner except for Contractor's work noted herein.
- 3.3. Contractor shall provide equipment required for executing inspection & testing by appointed firms.
- 3.4. Employment of inspection/testing Firms does not relax Contractor's responsibility to perform Work in accordance with the Contract Documents, and to supervise and inspect the progress of the Work to ensure performance of the Work in accordance with the Contract Documents. Where Contractor wishes to have tests or inspection performed to assure of such performance, the Contractor shall arrange and pay for such tests, and shall make test results available to the Consultant and Owner.
- 3.5. If defects are revealed during inspection and/or testing, the appointed firm will request additional inspection and/or testing to ascertain full degree of defect. Correct defects and irregularities as advised by Consultant at no cost to the Owner. Pay costs for re-testing and re-inspection.
- 3.6. Allow inspection/testing Firms access to the Work and its performance wherever it is taking place, including offsite manufacturing and fabrication plants. Contractor shall co-operate to provide reasonable facilities for such access.
- 3.7. Procedures required of the Contractor
 1. Notify the appropriate firm and Consultant in advance of the 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 delay in the Work.
 3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

4. DEFECTIVE WORK, NON-CONFORMING WORK

- 4.1. Refer to GC 2.4 and GC5.9 as amended by the Supplementary Conditions.
- 4.2. Remove defective Work, whether the result of poor workmanship, use of defective products or damage and whether incorporated in the Work or not, which has been rejected by the Consultant as failing to conform to the Contract Documents. Replace or re-execute in accordance with the Contract Documents at no cost to the Owner.
- 4.3. Make good other Contractor's work and/or existing conditions affected by the Work damaged by such removals or replacements promptly.
- 4.4. If in the opinion of the Consultant it is not expedient to correct defective Work or Work not performed in accordance with the Contract Documents, the Owner may deduct from the Contract Price the difference in value between the Work performed and that called for by the Contract Documents, the amount of which shall be found by the Consultant. This amount shall include for costs the Owner may bear for additional services of the Consultant.
- 4.5. No payment by the Owner, nor use of the construction or a portion thereof shall constitute an acceptance of any portion of the Work or Products which are not in accordance with the requirements of the Contract Documents.

5. FIELD ENGINEERING

- 5.1. Qualifications: Personnel experienced and fully capable of operating levelling and measuring equipment, establishing reference points, performing building layouts, taking and transferring levels, and recording data and information in log form, as proposed by Contractor and acceptable to Owner and Consultant. For survey reference and building layout, registered surveyor.
- 5.2. Survey Reference: Establish existing base horizontal, control points, and vertical points in conjunction with Owner at commencement of project. Preserve permanent reference points during construction. Make no changes or relocations without prior written notice to Owner. Report to Owner when a reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations. Replace control points in accordance with original control.
- 5.3. Survey Requirements
 1. Establish lines and levels, locates and lay outs for all services, floors, and other surfaces, all by instrumentation.
 2. Establish pipe invert elevations and cover to finished grade.
 3. Establish sub-base and base course levels and profiles.
 4. Establish lines and levels for mechanical and electrical work.
 5. Establish rates of rise and fall for roofing, surfaces governed by requirements for the disabled, drainage surfaces, and authorities.
 6. Confirm all existing conditions and report any discrepancies or variation from assumptions.
- 5.4. Maintain a complete, accurate log of control work as it progresses. On completion of under floor and ceiling work, prepare an as-built drawing showing dimensions, locations, angles and elevations of services both existing and new. Relate new work to the existing building layout and foundation.

6. SUBSURFACE CONDITIONS

- 6.1. Promptly notify the Consultant in writing if subsurface conditions at the Place of the Work differ materially from those discerned from the Contractor's inspection of the site, Contract Documents, and existing documentation outlined in Section 002200 and incorporated into the completed Bid Form, or a reasonable assumption of probable conditions based thereon.
- 6.2. After prompt investigation, should Consultant determine that the conditions do differ materially, instructions will be issued for changes in the Work as provided in GC 6 Changes in the Work.
- 6.3. Follow instructions issued by Owner and Consultant and co-ordinate any changes to the Work required.

015010 TEMPORARY FACILITIES

1. GENERAL

- 1.1. Provide temporary construction facilities in order to execute work expeditiously, and maintain temporary facilities in good operating order. Use of Owner's or Owner's Landlord's temporary facilities is prohibited. Contractor to provide all such items.
- 1.2. Remove temporary facilities from site when directed by Consultant, and prior to application for Substantial Completion. Return areas, equipment, and items to a clean, neat, and "as existing" or "as new" condition as applicable. Make good all damage promptly at no cost to the Owner.

2. PARKING FACILITIES

- 2.1. Parking is available at the Place of the Work, to within the areas identified by the City to the Contractor. Further parking facilities beyond these areas may be arranged only by special arrangement with the Owner's Landlord. However such parking is at the Contractor's discretion, and must not interfere with construction sequencing, construction operations or the Owner's Landlord's use of the parking.
- 2.2. All fines for illegal parking are at the Contractor expense. Contractor is especially cautioned that parking in the streets of adjacent residential neighbourhoods shall be discouraged. If additional parking is required, make special arrangements with the Owner.

3. DELIVERY FACILITIES

- 3.1. All deliveries shall take place at the Site in an efficient and timely manner, and vehicles shall be immediately off-loaded and removed from the Site. Post signage to indicate delivery requirements. All delivery orders shall be accompanied by clear instructions regarding how to access the Site, during what hours, and by what arrangements.

4. SITE STORAGE & LOADING FACILITIES

- 4.1. Provide adequate and secure storage for materials and equipment. Do not store materials provided under the Contract offsite after payment for such items has been applied for. Provide such storage within the bounds of the Place of the Work under the control of the Contractor. Pay all costs for such storage. In accordance with CCDC 2 - 2008, GC 3.11 as modified by the Supplementary Conditions.

- 4.2. Confine work and operations of employees to limits indicated by Contract Documents or to immediate area of work. Do not unreasonably encumber premises with products.
- 4.3. On-site storage of construction materials and equipment shall be kept to a minimum at all times. All materials being stored shall be protected by the Contractor from damage or loss and shall be repaired or replaced by the Contractor should damage or loss occur.
- 4.4. Do not load or permit to load any part of work with a weight or force that will endanger the work, or any part of existing structures, components or elements.
- 4.5. Do not store goods and materials within existing building outside of the Contractor's area, except with Owner's Landlord's prior written permission. Materials are to be stored in a location and manner to cause the least interference with work activities, pedestrian or vehicular traffic.
- 4.6. Where storage is not available within the existing building space, provide lockable sheds and trailers to store goods and materials. Pay parking costs associated with storage trailers.
- 4.7. Determine with the Owner those locations that are suitable for receiving and storage of materials and equipment.
- 4.8. All materials and equipment shall be kept in a secure area, at contractor's expense, or removed from the job site when work is not actually in progress.

5. CONTRACTOR'S SITE OFFICE

- 5.1. A site office is required at the site, within existing areas. A Site trailer is not required for this purpose.

6. CONTRACTOR'S TELEPHONE

- 6.1. Maintain cellular wireless telephone service for duration of project. Do not use Owner's existing telephone service. Telephone service shall be c/w voicemail.

7. SITE SIGNS AND NOTICES

- 7.1. No other signs or advertisements, other than signs for erection or display as requested by Owner, warning signs, or signs required by law, are permitted on site, without Owner's consent.
- 7.2. Notices for safety or similar instruction are permitted on site, and are to be in English language, or use commonly understood graphic symbols.
- 7.3. Maintain signs and notices for duration of project. Remove and dispose of signs off site when directed by Consultant.
- 7.4. Provide all work to erect and mount Project Sign (see Section 062000) and Consultants' signs outside of lines of hoarding, on independent posts with foundations into ground, together with Contractor's signs, at location directed by Consultant. Contractor's sign may not contain the words "design-build" or any reference to the contract arrangements other than as specific for this Project and Contract

8. CONTRACTOR'S SITE SIGNS AND NOTICES

- 8.1. A Contractor's sign is permitted on site, to be mounted to a location acceptable to the Owner. No other signs or advertisements are permitted on site. Only notices for safety, instruction, warning signs, or signs required by law are permitted on site. Such signs are to be in English language, or use commonly understood graphic symbols.

9. CONTRACTOR'S WASHROOM FACILITIES

- 9.1. The Contractor shall provide its own temporary sanitary facilities and maintain such facilities in accordance with applicable workplace legislation and to clean and odour-free standards. Pay all costs for temporary sanitary facilities. Keep ALL sanitary facilities neat, clean, and tidy, and post notices onsite to this effect. Existing building facilities may not be used by Contractor's forces.

10. HOISTING FACILITIES

- 10.1. Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
- 10.2. Hoists and cranes shall be operated by qualified operator.
- 10.3. Where Contractor chooses to erect a crane to facilitate ways and means of construction, submit proposed crane location for acceptance by Owner and provide all design and installation for the crane foundation. Provide evidence of how the crane function and operation will not trespass or overlap areas of the property and existing building that are occupied and used by the Owner and the public, with fail safe procedures.

11. ELEVATOR FACILITIES

- 11.1. The existing building passenger elevator may NOT be used for hoisting purposes, access to upper floors by Contractor, Trade Contractor or Suppliers, for delivery or transportation of materials, or for any other purpose that for use by Owner, existing Tenants and the public. Access to the Roof shall be via access stairs, and by prior written arrangement with the Owner.

12. CONSTRUCTION AIDS

- 12.1. Provide temporary stairs, ladders, ramps required for movement and placing of Products and materials, equipment, and personnel. Provide mechanical hoisting equipment and fully qualified operators as required during construction.

13. FIRST AID FACILITIES

- 13.1. Provide adequate first aid facilities to exceed requirements of applicable workplace legislation.

14. WASTE COLLECTION & DISPOSAL FACILITIES

- 14.1. Provide for garbage chutes, on-site debris collection and disposal equipment, and services needed to dispose of all debris.
- 14.2. Under no circumstance shall the Owner's Landlord's waste containers be used for disposal of debris arising from work of this Contract. Provide and pay for dedicated waste disposal for work of this Contract. Conform with requirements of Section 017042.

015020 TEMPORARY CONTROLS

1. GENERAL

- 1.1. Contractor shall provide all Temporary Controls in order to execute work expeditiously. Maintain

controls in good operating order, and remove from site after use.

- 1.2. Remove Temporary Controls from site when safe to do so, and prior to application for Substantial Completion. Return areas, equipment, and items to a clean, neat, and "as existing" or "as new" condition as applicable. Make good all damage promptly at no cost to the Owner.

2. SITE ACCESS CONTROL

- 2.1. Access to the Site for construction operations shall be coordinated with the City. No exceptions. This includes for deliveries, haulage, personnel access.
- 2.2. Maintain access at all times to all properties, and the existing facility in accordance with the required Sequence of Construction conditions. Do not encumber driveways, and walkways. Keep private roads within the property, and roadways beyond, clean of soiling. Clean minimum on a weekly basis, as required, and as further directed by the Owner, at the Owner's sole discretion.
- 2.3. Pay all costs for protection of and provision of temporary access to the building, site, and roadways for any activity or vehicle that may damage same. Ensure that temporary load distribution methods are employed over all substrates to ensure that wheel loading and movement of vehicles does not over-compact, crack, or otherwise damage existing surface finishes or underlying items such as service lines.

3. SITE ENCLOSURES

- 3.1. The safety and security requirements for this Contract include the requirement to separate the Place of the Work, to communicate and liaise, and to co-operate fully with the Owner's operations, safety and security protocols. Obtain a copy of such protocols from the Owner. The Contractor shall pay all costs for this part of the Work.
- 3.2. Provide separations as required to meet requirements of Ministry of Labour and other authorities having jurisdiction, to completely separate the area of the Work from other portions of the property, and to form a continuous security separation line. Provide enclosures to:
 1. For interior work adjacent occupied areas of existing building, provide solid opaque hoarding, consisting of steel studs with vapour retarder smoke and dust seal, and wallboard finish (to requirements of section 092000), taped, spackled, sanded and painted (to 099000), colour to Owner's Landlord's selection. Wallboard is required on the occupied side of such hoarding only. Provide complete to underside of deck.
- 3.3. Ensure security of both the area of the Work and the remainder of the existing Facility against vandalism so that the security of the facility and the progress of the Work is not compromised. Provide a temporary security alarm system, video surveillance, and/or onsite security staffing if deemed necessary by the Owner or the Consultant, at no cost to the Owner, where security issues or incidents make evident to the Owner that the Contractor's measures are inadequate.
- 3.4. Where interior hoarding is provided, or where required by Authorities, ensure exiting / egress is maintained and provide panic hardware as required.

4. GUARDS, GUARDRAILS, BARRICADES AND WARNING NOTICES

- 4.1. Provide temporary barriers to protect the workforce and the public from operations and risks. Provide temporary systems of restraints and anchorages in accordance with regulations and requirements of the Occupational Health and Safety Act and other applicable regulations. Design, erect, and maintain such facilities at no cost to the Owner.

5. SCAFFOLDING AND SHORING

- 5.1. Provide and maintain scaffolding and shoring in rigid, secure and safe manner, should scaffolding or shoring be required. Design of scaffolding is the sole responsibility of the Contractor, and shall conform to applicable codes and standards for such items. Erect scaffolding independent of walls, without interfering with work in progress.

6. WEATHER CONTROLS/CLOSURES

- 6.1. Erect enclosures to allow access for installation of materials and working inside enclosure. Construct enclosures complete as required to provide continuous conditions acceptable for the preparation of substrates, application of Products, curing or drying of Products, and protection until handover of the Work.
- 6.2. Design of enclosures is solely by the Contractor. Design enclosures to withstand wind pressure and snow loading if exposed to such loading.
- 6.3. Ensure that existing building enclosure is weather-tight at all times throughout select demolition and new construction to these existing enclosure elements (walls, roofs, below grade, without exception).

7. SECURITY CONTROLS

- 7.1. Comply with Owner's security requirements. Comply with Owner's directives regarding security. Where the existing building enclosure is opened, breached, or otherwise compromised by work of this Contract, install temporary closures to prevent unauthorized entry.

8. DUST CONTROLS

- 8.1. Provide dust tight screens or partitions to localize dust-generating activities, and for protection of workers, and finished areas of Work. Provide a complete dust proof enclosure to separate the areas of the Work from all other areas of the existing facility, at no further expense to the Owner.
- 8.2. Provide dust screens, covers, cloths, or other appropriate dust protection to keep surfaces, furnishings, equipment, fittings, and occupants' personal effects remaining in work spaces during work, completely free from dust and debris arising from the Work. Dust barriers shall be full height and be sealed to floors, ceilings and walls.
- 8.3. Install temporary filters to existing facility mechanical grilles, louvers, exhausts, etc., unless the Owner has consented to disconnect the equipment involved in which case seal off with temporary plastic sheet dust barriers.
- 8.4. Maintain and relocate protection until such Work is complete. Undertake demolition, cutting or holing work that may generate dust with wet methods to minimize dust generation wherever possible. Remove upon completion of dust-generating work, and make clean areas affected.

9. NOISE CONTROLS

- 9.1. Take all efforts to limit adverse impact of noise generating operations on adjacent areas.
- 9.2. Undertake Work in strict conformance with Municipality's Noise By-laws.
- 9.3. Take all efforts to limit adverse impact of vibration generating operations to the existing Facility and its structural and enclosure systems. Prior to commencement of excavation operations, and in particular prior to any compaction activities, install vibration recording station as set out elsewhere

in the Specification, and co-operate with the Owner's Testing and Inspection Agent for vibration testing of existing soils, and provide all mitigation measures to agent's recommendations so that existing facility and structure undergoes minimal vibration.

10. ODOUR CONTROLS

- 10.1. Where work, such as painting, asphaltting or roofing, will generate odours, take measures to limit migration of odours outside immediate work area and limit effect on workers.
- 10.2. Limit migration of odours to adjacent portions of facility, neighbourhood, and property.
- 10.3. Where odour generating activities take place after the facility has been occupied by the Owner, acceptable measures for odour control include working outside normal working hours to permit smells to dissipate by the time Owner's personnel return to work, or by ventilating. Only as a last resort, and the absence of any other acceptable measure, arrange shutdown of Owner's air handling equipment, and /or Owner's operations.

11. STORMWATER CONTROLS (DEWATERING AND DRAINAGE)

- 11.1. Provide temporary drainage and de-watering at no additional cost to the Owner.
- 11.2. Keep excavations and structures free from water. Locate pumps and organise pumped water and temporary site drainage complete with siltation control in strict co-operation with Owner to eliminate erosion, siltation, danger to the public and staff, and to prevent infiltration of solids into permanent drainage systems.
- 11.3. Ensure backup for continuous control of moisture in case of failure of primary systems.

12. PUBLIC TRAFFIC CONTROL

- 12.1. As required, provide and maintain notices, flag-persons, traffic signals, barricades and flares, lights, or lanterns as required to perform the work and protect the public.

13. PROTECTION OF EXISTING CONDITIONS AND WORK IN PROGRESS

- 13.1. Provide all temporary protection required to minimise damage to existing elements and conditions during the course of the Work. Damages caused through failure to protect shall be by the Contractor at no cost to the Owner.

14. PROTECTION FOR OFF SITE AND PUBLIC PROPERTY

- 14.1. Protect surrounding private and public property from damage during performance work. Be responsible for damage incurred.

15. PROTECTION OF BUILDING FINISHES & EQUIPMENT

- 15.1. Provide protection for finished and partially finished building finishes and equipment during performance of work. Provide necessary screens, covers and hoardings as required. Be responsible for damage incurred due to lack of or improper protection. Provide additional protection to prevent other damage where required.

16. TAB OUT/LOCK OUT (TOLO) PROCEDURES

- 16.1. All work to be done on systems or machinery, where the unexpected switching on or off of the system or machinery could result in personal injury, shall be done in accordance with the Contractor's standard TOLO procedures as approved by electrical authorities. The Contractor shall provide his/her own locks for the above procedure. At a minimum, TOLO procedures shall consist of switches padlocked in off position, and tagged to advise of inadvertent operation.
- 16.2. Where there is risk of injury to both the Owner and the Contractor's personnel due to equipment re-activation, double lockout procedures shall be employed, with each of the Contractor and the Owner providing separately keyed locks and tags to the switches. Do not remove locks and tags until each party's responsible has: independently ascertained that no injury will be caused to personnel by re-activating the equipment; and verified to the other party that no injury will be caused to personnel by re-activating the equipment.

17. TREE PROTECTION CONTROLS – N/A THIS PROJECT

- 17.1. Provide 4'-0" (1,220mm) high wood structure of posts and rails, with snow fence, to surround all adjacent trees to the Work and any storage or traffic areas involved in the Work. Under no circumstance shall vehicles park or shall materials be stored within the drip-line of any tree.

015030 TEMPORARY UTILITIES

1. GENERAL

- 1.1. Contractor shall provide Temporary Utilities in order to execute work expeditiously, as indicated herein. Remove from site all such work after use. Maintain temporary utilities and plant in good operating order. Use utilities and execute work to prevent waste of utilities.

2. WATER SUPPLY

- 2.1. There is site water supply piping existing in the Facility, to the existing area under renovation, that may be used in the Work by the Contractor. The Contractor shall pay for all costs of hooking up any temporary items to permit such uses by authorities having jurisdiction and utilities, including meters, connection fees, utility charges, installation of backflow prevention, and inspections.

3. POWER & LIGHTING

- 3.1. There is existing electrical power at the Place of the Work, at the existing Facility. All work for the installation of temporary power and lighting to requirements of the Contract for working conditions, including provision of temporary lighting, fixtures and devices, and feed runs from the Facility's nearest available source of power, shall be provided and maintained at the Contractor's expense.
- 3.2. Provide and maintain temporary lighting throughout project. Level of illumination on all floors and stairs shall not be less than 5 foot-candles (54 Lx), and for all boardwork, painting, and further finishing of the Work.
- 3.3. Do not use electricity for temporary heating.

4. HEATING AND VENTILATING

- 4.1. Contractor arranges for and pays for costs of temporary ventilation used during construction to

ventilate spaces containing excessive moisture, hazardous gases or materials, or excessive dust. New and existing building systems are not to be used for this purpose. Contractor pays for installation, operation, maintenance and removal of equipment. Provide ventilation in a safe manner with due consideration for the material being vented.

- 4.2. Contractor pays for costs for all temporary heating required for the Work. Use of direct-fired heaters discharging waste products into work areas is not permitted while areas are occupied by the workforce. Contractor pays for all temporary heating and ventilation costs to ventilate spaces containing hazardous gases or materials and excessive dust.
- 4.3. Provide temporary heat and ventilation in enclosed areas as required to facilitate progress of work, protect work and products against dampness and cold, prevent moisture condensation on surfaces, provide ambient temperatures and humidity levels for storage, installation and curing of materials, provide adequate ventilation to meet health regulations for safe working environment, and provide this particular ventilation as a separate system to the exterior.
- 4.4. Maintain temperatures of minimum 10°C and maximum of 26°C in areas where construction is in progress, unless indicated otherwise, or as may be required by manufacturer's instructions for materials being installed during heating period.
- 4.5. Maintain minimum temperature of 15°C or higher where specified as soon as finishing work is commenced and maintain until acceptance of structure by Owner.
- 4.6. Prevent accumulation of dust, fumes, mists, vapours or gases in areas occupied during construction.
- 4.7. Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas. Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- 4.8. Ventilate storage spaces containing hazardous or volatile materials.
- 4.9. Ventilate temporary sanitary facilities.
- 4.10. Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- 4.11. Maintain strict supervision of operation of temporary equipment to conform to applicable codes and standards, enforce safe practices, prevent abuse of services, prevent damage to finishes, and vent direct-fired combustion units to outside whenever spaces are occupied by the workforce.
- 4.12. On completion of building flush out for which permanent heating system is used as construction heating, replace permanent filters, and leave equipment clean.

015045 SAFETY REQUIREMENTS

1. GENERAL REQUIREMENTS

- 1.1. Contractor is solely responsible for all aspects of safety and for compliance with all rules, regulations and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Work.
- 1.2. Construction Safety Measures and Reference Standards
 1. Observe and enforce construction safety measures including but not limited to the Occupational Health and Safety Act, National Building Code 1990 Part 8, provincial government regulations, Workplace Safety Insurance Board requirements, WHMIS legislation and instructions, and

applicable municipal statutes and authorities, all as amended in their latest edition. In event of conflict between any provisions of authorities the most stringent provision governs.

2. The "Constructor" named in the latest addition of the Occupational Health and Safety Act, and the Workplace Safety Insurance Board Regulations, of the Province of Ontario, including any amendments, shall mean the "Contractor" for the work performed under this Contract, including work under Cash and Contingency Allowances.
- 1.3. In event of conflict between any provisions of authorities the most stringent provision governs.
- 1.4. Overloading: Contractor to ensure no part of Work or existing structures are subjected to a load which will endanger its safety or will cause permanent deformation.
- 1.5. Falsework: Design and construct falsework in accordance with CSA S269.1-1975.
- 1.6. Scaffolding: Design and construct scaffolding in accordance with CSA S269.2-M1980.
- 1.7. Shoring and Underpinning: Design and perform shoring and underpinning operations in accordance with applicable legislation, reference Codes and Standards, and the OHSA. Be fully responsible for the design and performance of such systems, as they form part of the ways and means for accomplishment of the Work. Note that structural design of building is for finished installation of components and systems only.
- 1.8. First Aid Facilities: Provide for duration of Contract site equipment and medical facilities necessary to supply first-aid service to injured personnel and in accordance with regulations in force from authorities having jurisdiction.

2. FIRE SAFETY

1.1. General Requirements

1. Comply with requirements of FCC no.301 Standard for Construction Operations, June 1982, or its latest edition or amendment, as issued by Fire Commissioner of Canada (FCC), and part 8 of the NBC. The more stringent requirements shall apply in all cases. Ensure that risk of fire is minimized, and that protective measures for controlling and extinguishing fire are in place prior to beginning any aspects of the work.
2. The existing fire alarm system and existing sprinkler system in the Facility must remain operational and cover the complete building at all times except by infrequent and special arrangement with the Owner and the local Fire Department in each instance. Pay all costs to maintain these systems and make these special arrangements.
- 1.2. Provide temporary fire protection throughout the period of construction, to new areas, to areas under the control of the Contractor, and to minimize risk to adjacent areas of the Facility under the Owner's control and occupancy. Particular attention shall be paid to the elimination of fire hazards.
- 1.3. Provide fire extinguishers as required by the stricter of the Occupational Health and Safety Act and regulations made thereunder, and the Ontario Fire Code.
- 1.4. All hot work must involve a fire watch for minimum 2 hours following completion of the work, and for such further time as the Contractor deems necessary to definitively rule out risk of fire from the hot work operation.
- 1.5. Electric & Gas Welding & Cutting Operations: Conduct all work involving electric and gas welding and cutting and grinding operations in accordance with the safety standards specified in the latest edition of CSA W117.

- 1.6. Flammable Liquids: Flammable liquids are to be kept to a minimum and shall be stored in approved safety containers. Do not store such materials or liquids in the building or structure, regardless of state of completion.
- 1.7. Fire: In the event of a fire call the municipal emergency response 911. Regardless of whether the fire is extinguished without using the City of Waterloo Fire Department response, immediately notify Owner and make full report of the fire incident.
- 1.8. False Fire Alarms: Reimburse the Owner, by means of a deduction from any amounts due the Contractor by the Owner, for all costs related to false alarms of the fire alarm system or the security alarm system attributable to acts or omissions of the Contractor. Costs shall include charges levied by local authorities, charges levied by the Owner's alarm monitoring service, labour and expense costs for Owner's staff to attend at site in response to a false alarm, Consultant's cost related to any work for a false alarm, all to a minimum of \$500 per false alarm incident.
- 1.9. Fire Alarm Activation: A fire alarm system that has been activated by other than testing shall not be reset until the cause of the alarm has been investigated and until authorized by the Owner or the Fire Department.
- 1.10. Fire Protection Systems or Equipment Impairment
 1. Take all precautions when fire protection equipment (nearby hydrants, sprinklers, chemical fire suppression systems, standpipes, fire extinguishers, related water service, etc.) is taken out of service, including but not limited to restricting all hot work operations and hazardous processes. Take measures to minimize the shut down or impairment of use of fire protection. Plan operations required to reduce system impairment time to the least amount possible.
 2. Advise Owner of complete or partial impairment of fire protection system, including time required, areas affected, etc., in accordance with Section 015034 Utilities and Owner's Operation, Safety, and Security Conditions, for Building System Service Interruptions.
 3. Provide temporary protection such as extra extinguishers during all periods of fire protection equipment impairment.
 4. If fire protection system is restorable, either in whole or in part, assign personnel during the period of impairment to restore the system promptly in the event of a fire.
 5. During periods when existing fire protection systems (fire alarm, sprinkler system) is interrupted, establish and maintain a fire watch, including but not limited to the following:
 1. Patrol all corridors and high-risk areas affected.
 2. Fire patrol shall have immediate access to a phone to call 911 if they see a fire.
 3. Report all other problems encountered.
 4. Remain on patrol until fire protection system is returned to full operation.

015060 ENVIRONMENTAL REQUIREMENTS

1. FIRES

- 1.1. Fires and burning of rubbish on the site or the Project property are not permitted.

2. DISPOSAL OF WASTES

- 2.1. Do not bury rubbish and waste materials on site. Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers. Dispose of waste

hazardous materials and designated substances in accordance with requirements of manufacturer and authorities having jurisdiction.

3. POLLUTION CONTROL

- 3.1. Provide and maintain temporary erosion and pollution control features. Control gas and noise emissions from equipment to the requirements of applicable reference standards and codes, and to Owner's and local authorities requirements. Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures. Cover and/or wet down dry materials and rubbish to prevent blowing dust and debris.

4. RECYCLING OF MATERIALS

- 4.1. Regardless of applicable legislative and regulatory requirements, deliver to nearest appropriate depot all materials accepted for recycling by the region or municipality having jurisdiction over the place of the Work, including but not limited to cardboard, paper, plastic, aluminium, steel, and glass. Deliver to nearest appropriate depot all scrap and excess material for recycling of this material. Pay all costs for this work.

5. HAZARDOUS MATERIALS AND DESIGNATED SUBSTANCES

- 5.1. Comply with Ontario regulations and criteria regarding the handling and care for the presence of, or potential presence of, Toxic Materials, Hazardous Materials, or Designated Substances under the Environmental laws of the Place of the Work, and OHSA. Perform all work with due care for the presence of such materials, either in Existing Conditions or within aspects of Products or materials for the Work. Stop aspects of the Work as appropriate and immediately inform Consultant and Owner should the presence of any such material be suspected unless the material has already been identified and work processes put in place to perform the Work in the presence of such material.

6. TOXIC OR HAZARDOUS SUBSTANCES OR MATERIALS

- 6.1. *Toxic or Hazardous Substances or Materials* means, collectively or individually, any contaminant, waste, subject waste, pollutant (as defined in the Environmental Protection Act (Ontario) and regulations thereunder), toxic substance (as defined in the Environmental Protection Act (Canada), dangerous goods (as defined in the Transportation of Dangerous Goods Act (Canada) and regulations thereunder), asbestos (as defined in the Occupational Health and Safety Act (Ontario) and regulations thereunder), petroleum, its derivatives, by-products or other hydrocarbons, as defined in or pursuant to any applicable, laws, regulations, by-laws, guidelines or orders rendered by any governmental authority or any other substance or material which when released to or present in the natural environment may cause in some immediate or foreseeable future time, material harm or degradation of the environment or material risk to human health, whether or not defined in any federal, provincial, territorial or municipal laws, statutes or regulations.

016010 BASIC PRODUCT REQUIREMENTS

1. DEFINITIONS

- 1.1. *Product* is defined in accordance with the Definitions of the Contract as "material, machinery, equipment, and fixtures forming the Work, but does not include machinery and equipment used to prepare, fabricate, convey, or erect the Work, which are referred to as construction machinery and equipment."

- 1.2. *Supplier* is defined in accordance with the Definitions of the Contract as “a person or entity having a direct contract with the Contractor to supply Products not worked to a special design for the Work.”
- 1.3. *Supply* is hereby defined for the purposes of this Contract as “perform all work required to deliver Products FOB the designated site in undamaged, new condition in accordance with the Agreement, General Conditions as modified by the Supplementary Conditions, Co-ordination, Schedule, and Product requirements of Section 016010 and the Contract. The term supply shall be deemed inclusive of all applicable costs for manufacture, protection, storage, loading and unloading, demurrage, transportation, insurance, fees for royalties or patent rights, all duties, and all taxes except the Federal Goods and Services Tax. The term supply shall be read to mean in all cases “supply by the Contractor as part of the Work” unless the context specifically states that the Owner or Consultant or authority having jurisdiction shall supply.”
- 1.4. *Install* is as defined in Section 017010 Basic Execution Requirements.
- 1.5. *Provide* is defined in accordance with the Definitions of the Contract as “to supply and install.” The term provide shall be read to mean in all cases “provide by the Contractor as part of the Work” unless the context specifically states that the Owner or Consultant or authority having jurisdiction shall provide.

2. GENERAL

- 2.1. Supply Products in accordance with the procedures for scheduling the Work, procedures for submittals, special procedures, requirements for co-ordination, requirements for temporary facilities, and with due regard for sustainability and environmental impact, as described elsewhere in this Division. Supply Products in a timely manner so as not to impede the progress of the Work.
- 2.2. Where Products are supplied by the Owner for incorporation into the work of this Contract, the Contractor shall: unload; handle; promptly inspect delivered products; report to Consultant the condition of items received; pay demurrage charges; install, connect and finish products specified; remove packaging material from site and recycle; and clean products. Transportation of products supplied by the Owner will be paid for by the Owner.

3. PRODUCTS

3.1. Quality

1. All Products incorporated in the work shall be new, not damaged or defective, and of the best quality for the purpose intended. If requested, furnish evidence as to type, source and quality of Products.
2. Defective Products, whether identified prior to or after delivery, installation, or during warranty periods, will be rejected, regardless of previous inspections, reviews, or certifications for payment. Inspection and review does not relieve Contractor’s responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
3. Should any dispute arise as to the quality or fitness of Products, the decision rests strictly with the Consultant based upon the requirements of the Contract Documents.
4. Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.
5. Permanent labels, trademarks and nameplates on products are not acceptable, except where required for operating instructions, or when located in mechanical or electrical rooms.

3.2. Availability

1. Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of items are foreseeable, notify the Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Contract.
2. In the event of failure to notify the Consultant and should it subsequently appear that work may be delayed for such reason, the Consultant reserves the right to substitute more readily available items of similar character, at no increase in Contract Price.

3.3. Manufacturer's Instructions

1. All Products shall be supplied with written manufacturers' instructions for care, handling, transportation, and installation suitable for the specific purposes and conditions intended in the Work.
2. Notify the Consultant in writing, of conflicts between the Contract requirements and manufacturer's instructions, so Consultant may establish the course of action.
3. Improper installation or erection of Suppliers' products due to failure in complying with these requirements authorizes the Consultant to require removal, and reinstallation at no increase in Contract Price.

3.4. Transportation

1. Pay costs of transportation FOB to the site of products required in the performance of the work.

3.5. Storage, Handling, and Protection

1. Handle and store products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instruction when applicable.
2. Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in the work.
3. Store products subject to damage from weather in weatherproof enclosures.
4. Store cementitious products clear of earth or concrete floors, and away from walls.
5. Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
6. Store components and equipment in accordance with Supplier instructions.
7. Store and mix paints in a heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
8. Immediately remove and replace damaged or rejected materials from the work site at own expense and to the satisfaction of the Consultant.

3.6. Labels and Trademarks

1. Trademarks and labels including applied labels shall not to be visible in finished work, except that an engraved name of manufacturer and model number may appear on manufactured equipment within service rooms and service spaces. Contractor shall remove all labels and trademarks in such manner that finished surfaces are not damaged and are free of adhesive. The Owner shall backcharge the Contractor for such work where it is deficient.

2. Exception to this requirement is any trademark or label which is essential to obtain identification of mechanical and electrical equipment or devices for maintenance purposes, government ratings, CSA or other government approvals.
3. Permanent labels, trademarks and nameplates on products are not acceptable, except where required for operating instructions, or when located in mechanical or electrical rooms.

3.7. Fastenings and Accessories

1. Supply all fastenings and accessories required for the installation of Products, whether specifically identified on drawings and specifications or not. All fastenings and accessories reasonably inferable as required for a complete, finished, functional installation are included in the requirements of the Work and the Contract Price.
2. Supply appropriate fastenings to prevent electrolytic action between dissimilar materials.
3. Use non-corrosive hot dip galvanized steel fastenings and anchors for securing all work where located to exterior of enclosure, within enclosure assemblies, and in all unheated areas, unless stainless steel or other material is specifically requested in the Documents.
4. Design fastening, anchorage and support systems to withstand forces and service conditions that can be reasonably expected at the Place of the Work, including the possibility of wilful damage by vandalism to all areas accessible to the public. Design fastenings and adjustable systems to ensure that fastening withstands repeated reversals of loads and other oscillations associated with service conditions without damage to fastenings or materials fastened.
5. Friction fastening, pressure fit connections, or other connections which do not have threaded and tapped fastening through full depth of joined materials are not acceptable for fastening of major Product components.
6. Do not use powder-actuated fastenings.
7. All screw fastenings shall be Robertson wherever possible.
8. Supply fastenings in quantities and quality to space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood plugs, or any other organic material plugs, are not acceptable.
9. Keep exposed fastenings and onsite installed fastenings to a minimum, and evenly spaced. Shop install neatly where ever possible.
10. Fastenings causing spalling or cracking of material to which anchorage is made are not acceptable.

3.8. Substitutions or Alternatives

1. Product alternatives will be considered by the Owner prior to the award of the Contract only in the form prescribed by the Tender Documents. Upon award of Contract, supply Products and items of work as specified and required for the completeness of the Work and to the requirements of the Contract Documents. No substitutions are permitted without prior written approval by Owner.
2. Proposals for substitution of Contract requirements may be submitted after award of the Contract. Such requests must include statements of respective costs of items originally specified and the proposed substitution. All requests for substitution shall be reviewed by the Consultant as an additional service to its Contract with the Owner, and such costs shall be deducted from the Contract Price in reimbursement of the Owner's additional cost.

3. Proposals will be considered by Consultant only:
 1. if the Product selected by Contractor from those specified is not available;
 2. if delivery date of the Product selected from those specified would unduly delay completion of the Contract; or
 3. if an alternative Product to that specified, brought to the attention of and considered by Consultant as equivalent to Product specified, will result in a credit to the Contract Price.
4. Should a proposed substitution be accepted, either in part or in whole, assume full responsibility and costs when substitution affects other portions of the Work. Pay for design or drawing changes required as a result of the substitution.
5. Amounts of all credits arising from approval of substitutions will be determined by Consultant and the Contract Price will be reduced accordingly after approval by the Owner.

017010 BASIC EXECUTION REQUIREMENTS

1. DEFINITIONS

- 1.1. *Install* is hereby defined for the purposes of this Contract as "do all things and perform all activities, excluding only the supply of Products, that are necessary to complete the Work in accordance with the Agreement, General Conditions as modified by the Supplementary Conditions, Co-ordination, Schedule, Existing Conditions, and Execution requirements of the Contract. The term *install* shall be deemed inclusive of all applicable costs for conforming to requirements of Division 1 (except Section 016010, whose costs shall be included in the cost of supply), protection, storage onsite, labour, tools, construction machinery and plant, erection, fastening, placement, fees for royalties or patent rights for processes, insurance, all overhead on such items, all duties, and all taxes except the Federal Goods and Services Tax." The term *install* shall be read to mean in all cases "install by the Contractor as part of the Work" unless the context specifically states that the Owner or Consultant or authority having jurisdiction shall install.
- 1.2. *Supply* is as defined in Section 016010 Basic Product Requirements.
- 1.3. *Provide* is defined in accordance with the Definitions of the Contract as "to supply and install." The term *provide* shall be read to mean in all cases "provide by the Contractor as part of the Work" unless the context specifically states that the Owner or Consultant or authority having jurisdiction shall provide.
- 1.4. For definitions of *Tolerance*, *Plumb*, *Level*, *Square*, and *Straight* see Quality Control provisions as described elsewhere in Division 1.

2. GENERAL

2.1. General

1. Install Products in accordance with the procedures for scheduling the Work as described elsewhere in Division 1. Install Products in a timely manner so as not to impede the progress of the Work.
2. Install Products in accordance with reviewed and accepted Submittals as described elsewhere in Division 1. Install Products as identified on reviewed and accepted Submittals.
3. Install Products in accordance with Special Procedures as described elsewhere in Division 1.

4. Install Products in accordance with requirements for co-ordination of the Work as described elsewhere in Division 1.
5. Install Products in accordance with requirements for temporary facilities and safety as described elsewhere in Division 1.

2.2. Examination

1. Prior to submitting a tender for the performance of the Work, examine the Contract Documents, the existing conditions, the site, the Owner's property, access routes both public and private, and surrounding areas.
2. Be fully informed as to the conditions and limitations under which the Work is to be executed. Perform requirements of Section 019010 and for Building Systems prior to beginning installation of materials and products. Provide detailed design of items as required to provide all aspects of building systems to exceed the performance requirements of the systems and to achieve their design intent. Claims for additional costs will not be entertained with respect to conditions or limitations that can reasonably be inferred by examination or that are required to provide complete and functional building systems.
3. Contractor shall require Subcontractors to perform the examination for all aspects of conditions that may affect portions of the Work.
4. Promptly notify the Consultant of any conditions during the course of the performance of the Work that in the Contractor's opinion are at significant variance with conditions at time of tendering. Consultant shall determine the Contract requirements and any changes thereto.

2.3. Contractor's Use of Site and Place of the Work

1. Contractor's Use of Site and Place of the Work shall be in strict accordance with Owner's requirements for access and other existing conditions noted in Documents and incorporated into the Contract as per Contractor's completed tender form. Contractor shall co-ordinate the execution of the Work, including noise and other forms of pollution, for minimal interference with the Owner's use and enjoyment of the adjacent portions of the site and property. Pay all costs and comply with Owner's instructions for pollution abatement, including noise abatement when requested.
2. Do not unreasonably encumber the site with Products, materials, or equipment. Co-ordinate supply for a timely installation in accordance with the schedule.
3. Move stored Products or equipment that interferes with operations of Owner, Consultant, or Other Contractors at no cost to the Owner, Consultant, or Other Contractors.
4. Obtain and pay for additional storage or work areas needed for operations as required.
5. Undertake all precautions to prevent vandalism or damage, especially which might delay the progress of the Work, to Products, to the installed portions of the Work, and to the site generally.
6. Accept full responsibility for assigned work areas and site from the time of Contract award until handover of the completed Work to the Owner.

2.4. Mockups

1. Where required by the Contract Documents, requested by Consultant, or recommended by Product Suppliers, construct mockups of installations onsite, in size and location as directed by Consultant.

2. Construct mockups prior to start of affected work. Allow sufficient time for review and acceptance of procedures by all concerned, including Product Suppliers, prior to scheduling main installation work for items and systems mocked up.
3. For all Building Systems, the nominated entity responsible for the installation of the Building System shall review and make recommendation as to the need for mockups of aspects of the System installation. Report such recommendations in writing to the Owner and Consultant, and arrange for the installation of mockups as directed.
4. Make revisions or re-erections of mockups until mockup, including installation sequences, is acceptable to Consultant and all Product Suppliers.
5. Acceptable mockups, by prior arrangement, may be incorporated into finished work if accepted by the Consultant.

2.5. Concealment

1. Conceal ductwork, piping, conduit, wiring and other portions of Building System distribution that is located in or near finished areas. Locate in ceiling, wall, and furring spaces unless specifically noted to be exposed.
2. If any doubt arises as to means of concealment, or intent of the Contract Documents in this connection, request clarification from Consultant before proceeding with portion of work in question.

2.6. Dimensions and Levels

1. Check and verify dimensions and levels. Inform Consultant immediately of any errors or discrepancies found. Dimensions, where pertaining to work described elsewhere or described by submittals or manufacturer's instructions, shall be verified with all Subcontractors and Suppliers concerned. Assume full responsibility for dimensions and layout. Subcontractors may not layout work without review and approval of such layout by the Contractor.
2. Do not scale drawings. If there is any ambiguity, lack of information or inconsistency, immediately inform the Consultant and follow the Consultant's instructions.
3. Critical dimensions may be indicated by use of the word "HOLD" on drawings. Give these dimensions priority.
4. Where dimensions are accompanied by the words "Job Check", such dimensions shall be field verified and communicated to all trades concerned. Where field measurement differs significantly from dimension shown, inform Consultant and obtain clarification of requirements.
5. Where dimensions are shown with calculations (for example, "12 bricks + 13 joints, 8' 0 1/4") verify supplied Product sizes with accepted submittals and Suppliers, and inform all trades that may be affected by the dimension. Inform Consultant of any discrepancy.
6. Where graphic indications on drawings show consistent relations amongst parts of the work, and upon layout according to dimensions these relationships appear significantly different, inform Consultant immediately and prior to commencing work upon which the dimensioning depends. Follow Consultant's instructions for layout.
7. Lay out curves using radii. Where radii are overly large for such layout, inform Consultant and Consultant will provide computerised data as a cross-check for layout.
8. The Contractor and all trades shall employ the same system of measurement as the drawings, either metric or imperial as the case may be. Under no circumstances shall dimensions be converted during the laying out of any portion of the work.

9. Install all components of the Work plumb, true, square, and level unless specifically noted otherwise.

2.7. Location of Fixtures and Devices

1. Location of fixtures, apparatus, equipment, fitting, outlets, devices, pipes, conduits, ducts and other portions of Building Systems shown or specified but not dimensioned shall be considered approximate. Contractor shall prepare interference drawings where any doubt may occur, as described elsewhere in Division 1.
2. Request direction from Consultant to establish exact locations. Any relocation caused by Contractor's failure to request direction from Consultant, including repairs and replacement of affected work adjacent, shall be done by the Contractor at no added expense to the Owner. Where job conditions require reasonable changes in indicated locations and arrangements, make changes at no cost to Owner.
3. Conserve space and co-ordinate the Work as described elsewhere in Division 1 so as to ensure that ducts, pipes, conduits, portions of Building Systems and other items will fit into allocated wall and ceiling spaces, while ensuring adequate space for access and maintenance. Be especially mindful of requirements for clearance for hinged access covers.
4. Where ducts, piping, conduits, or other portions of Building Systems are permitted to be exposed they shall be neatly and uniformly laid out parallel to adjacent building lines and parallel to each other where they run in the same general direction. Review exposed installations with Consultant prior to start of work. At no cost to Owner make changes to exposed work as directed by the Consultant.
5. Except where specifically noted on drawings for individual items, install exposed devices, fixtures, and other items including outlets, switches, sensors, thermostats, panels, grilles, and other items in an orderly and neat manner, lining up with each other and grouped together where possible. Review installation with Consultant prior to start of rough-in work. Relocate at no cost to Owner any work that does not meet this requirement.
6. Review location of devices for potential interference of door swings, furnishings placement, or other interferences likely to occur in the occupied and furnished Work. Bring any concerns to the attention of the Consultant prior to rough-in and follow instructions for relocation if required at no cost to Owner.
7. Owner reserves the right, prior to rough-in, to relocate any device or item over a distance of not more than 5'-0" (1525mm) from its indicated or dimensioned position on the drawings, at no change in Contract Time or Contract Price.

3. QUALITY OF WORK AND INSTALLATION

3.1. Manufacturer's Instructions

1. All Products shall be supplied with written manufacturers' instructions for care, handling, transportation, and installation suitable for the specific purposes, building system design intent, and conditions of the Work.
Maintain copies of these instructions onsite, available for review by the Owner and Consultant. Products shall be supplied ready to meet the performance requirements of the system of which it forms a whole or part, without onsite alteration that could more reasonably have been performed by the supplier or in a manufacturing setting.
2. Notify the Consultant in writing, of conflicts between the Contract requirements and manufacturer's instructions, so Consultant may recommend the course of action.

3. Improper installation or erection of supplier's products due to failure in complying with these requirements authorizes the Consultant to require removal, and reinstallation of new products at no increase in Contract Price.
4. Where specific requirements of the Contract Documents are in conflict with manufacturer's written instructions, follow the more stringent requirements and inform Consultant. All costs for this requirement are deemed included in the Contract Price and Contract Time.

3.2. Workmanship

1. Workmanship shall be the best quality, executed by supervisors, journeymen, mechanics, and labour experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required work is such as to make it impractical to produce required results.
2. Unless otherwise specified in a more detailed manner, workmanship is to be of the highest quality recognised by the trade executing the work in accordance with best standards of practice, by the best methods recommended by the manufacturer of the product and as reviewed and accepted by the Consultant.
3. In no case proceed in uncertainty with regard to workmanship standards required for the Work or any of its aspects. Performance of Work or any of its aspects is acknowledgement that the Contractor and all personnel performing work are fully cognisant of best means and methods for such work or aspect of the Work, and are proceeding by implementing these means and methods. Remove and replace any portions of the Work not so performed, as directed by the Consultant, and replace all products and items of the Work to meet required standards of workmanship at no cost to the Owner.
4. Decisions as to the quality or fitness of workmanship in cases of dispute rest with the Consultant, whose instructions shall be promptly executed.
5. Do not employ any unfit person or anyone unskilled in their required duties. Enforce no smoking policies, and ensure that personnel are respectful of the public. The Consultant reserves the right to require the dismissal from the site of workers deemed incompetent, careless, insubordinate or otherwise objectionable.

4. INSTALLATION OF FASTENINGS, INSERTS, AND ACCESSORIES

4.1. General

1. Design and provide all fastenings and accessories required for the installation of Products, whether specifically identified on drawings and specifications or not. All fastenings and accessories reasonably inferable as required for a complete, finished, functional installation are included in the requirements of the Work and the Contract Price.
2. Do not use powder-actuated fastenings or fasteners stressed in withdrawal.
3. All screw fastenings shall be Robertson wherever possible.
4. Supply fastenings in quantities and quality to space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable. Do not use wood fastenings for metal connections, and use wood fastenings appropriate to type of wood products being connected.
5. Keep exposed fastenings and onsite installed fastenings to a minimum, for even spacing. Shop install neatly where ever possible.

6. Install fastenings appropriately so as to prevent electrolytic action between dissimilar metals and materials.
7. Use non-corrosive hot dip galvanized steel fastenings and anchors for securing exterior work, work within exterior enclosure assemblies, and to all unheated spaces, unless stainless steel or other material is specifically requested in the affected specification section.
8. Where fasteners may need adjustment, torque readings, maintenance, or are to be removed during in-service maintenance of the completed Work, locate these fasteners so that fasteners are accessible with tools for easy removal and replacement.
9. Countersink fasteners and conceal wherever possible.
10. Supply and install all inserts required for fasteners. Ensure compatibility of insert by using same manufacturer or checking with fastener manufacturer regarding acceptability.
11. All fastening of pre-finished material shall use concealed methods. No cup washers.

4.2. Design and Installation of Connections

1. Design fastening, anchorage and support systems to withstand forces and service conditions that can be reasonably anticipated from the Place of the Work and the intent of use of the work, including vandalism in publicly-accessible spaces. Design fastenings and adjustable systems to ensure that fastening withstands repeated reversals of loads and other oscillations associated with service conditions without damage to fastenings or materials fastened.
2. Friction fastening, pressure fit connections, or other connections which do not have threaded and tapped fastening through full depth of joined materials are not acceptable for fastening of major Product components.
3. Installation of fastenings which cause spalling or cracking of material is not acceptable. Locating fastenings near edges of materials where strength of fastened materials is insufficient to withstand design stresses during the service life of the completed Work is not acceptable.
4. Design and execute fastening work using principles of redundancy and “fail-safe” methods. Under no circumstances shall items be connected with a single fastener only.
5. Submit samples of fasteners and all fastening designs not explicitly detailed in the Drawings or described in the specification for review and acceptance as described elsewhere in Division 1, prior to installation.
6. Designs of connections and fastening for all components governed by the design of an Engineer shall be designed by an Engineer licensed to practice at the place of the Work and registered with the Province of Ontario to provide building code certification for the applicable discipline of design. Pay all costs for such design as part of the Work.

5. INSTALLATION REQUIREMENTS FOR ANTICIPATED SERVICE LIFE

5.1. Movement and Tolerance

1. All Products shall be installed in strict accordance with written Product Suppliers’ or manufacturers’ instructions for best in-service performance for the specific location and potential in-service conditions that are reasonably inferable from the design and intent of the building system of which it forms the whole or a part.
2. Provide control joints, expansion joints, laps, fastening designs and executions, and erection

procedures and sequences that will permit expansion and contraction or other forms of in-service movement in the installed Product or material. The finished Work shall be capable of such in-service movement without causing distortion; failure of seals, joints, or integrity of Building Systems; undue stress; cracking; bowing; or other defects detrimental to appearance, longevity, performance of the Product of Building System of which it is a part.

3. Erect and install Products with due regard for sequencing of dead loads and live loads that will be imposed upon the installation during subsequent construction and during the in-service life of the Work.
3. Anchor exterior envelope components to structure in manner suitable to accommodate structural deflection and creep. Design anchorage to withstand expected live loads, positive and negative, in accordance with the requirements of the Contract Documents, good construction practice, and applicable codes and standards.
4. Erect and install Products with due regard for sequencing of construction operations and the presence of excess moisture prior to exterior envelope enclosure, in the installed Product, in other Products in the shared environment, and processes in that environment. Design installation so that curing, drying, and changes in moisture content by Building Systems will affect performance or appearance of installed Products.

5.2. Design of Separations, Control of Drainage, Control of Pressure, Redundancies

1. Provide all separation or division of air spaces in floor assemblies and fire separations to ensure firestopping requirements of applicable codes are met.
2. Ensure that Products are installed for best performance in service conditions where adjacent Products may have failed. Use principles of redundancy, overlap, fastening, good drainage, and organise lapping of materials to shed moisture rather than trapping it.

5.3. Submissions

1. Submit samples, sketches, designs, or applicable trade and manufacturers' literature showing intended design for tolerances, movement, separations, control and redundancy for review and acceptance to procedures as described elsewhere in Division 1, prior to installation.
2. Designs that include components governed by the design of a professional shall be designed by an professional licensed to practice at the place of the Work and registered with the Province of Ontario to provide building code certification for the applicable discipline of design. Pay all costs for such design as part of the Work, and provide proof of professional liability insurance against errors and omissions as part of the first submission.

017041 CLEANING

1. GENERAL REQUIREMENTS

- 1.1. Conduct cleaning and disposal operations to comply with local ordinances and applicable laws.
- 1.2. Store volatile waste in covered metal containers, and remove from site at end of each working day.
- 1.3. Prevent accumulation of other waste by removing such waste at appropriate intervals from the site, not to exceed weekly.
- 1.4. Provide adequate ventilation during use of volatile or noxious cleaning substances. Use of building ventilation systems is not permitted for this purpose.
- 1.5. Use only cleaning materials recommended by both manufacturer of surface to be cleaned and by cleaning material manufacturer. Make good damage to finishes at no expense to Owner.

2. CLEANING DURING PROGRESS OF WORK

- 2.1. Maintain the site, including adjacent private and public property, so as to keep such areas free from accumulations of waste material and debris.
- 2.2. Provide on-site containers for waste and recycling materials, to location(s) approved by Owner.
- 2.3. Recycle all excess and waste material at depots designated by municipal or regional authorities, and as outlined elsewhere in Division 1 for sustainable environmental objectives. Pay all fees.
- 2.4. Dispose of waste and debris at approved municipal or private waste or recycling facilities. Pay all fees and provide copies of all tickets to Owner.
- 2.5. Schedule cleaning operations so that dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems whether existing or new.
- 2.6. Vacuum clean interior surfaces and areas when ready to receive painting and finishes. Continue vacuum cleaning until such areas are ready for Substantial Completion or occupancy, whichever occurs later.

3. FINAL CLEANING

- 3.1. In preparation for acceptance of the project on an interim or final basis perform final cleaning in coordination with requirements of Contract Closeout specified elsewhere in Division 1.
- 3.2. Contractor is responsible for cleaning of all areas affected by the Work, including existing elements of the Project and the Project site, areas of temporary use and storage, and access routes throughout the premises used for access to areas where work is performed.
- 3.3. Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, mechanical and electrical fixtures. Replace broken, scratched or disfigured glass. Leave existing items in better condition than as encountered at the start of the Work.
- 3.4. Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fittings, walls, and floors.
- 3.5. Vacuum clean and dust building interiors, behind grilles, and screens. Thoroughly vacuum clean interior of all electrical and mechanical equipment.

- 3.6. Wax or finish, seal, shampoo and prepare floor finishes, including existing where affected by the Work, as recommended by the manufacturer and after consultation with the Owner's maintenance staff. Seal floors with 2 coats of recommended sealer, except carpeted areas.
- 3.7. Remove dirt and other disfigurations from surfaces.
- 3.8. Clean and sweep exterior areas affected by the Work, as well as all access routes within the building to the Place of the Work and any washroom facilities used by the Contractor.
- 3.9. Clean equipment and plumbing fixtures and HVAC components, including ductwork, to a sanitary condition. Clean or replace equipment filters at the direction of the Consultant.

017042 CONSTRUCTION WASTE MANAGEMENT

1. DEFINITIONS

- 1.1. *Solid Waste*: Any waste material (including land-clearing debris) that is sent from the Project Site to another location for disposal.
- 1.2. *Land-Clearing Debris*: Waste materials resulting from land-clearing that include pre-existing development materials and plant matter, but do not include soil.
- 1.3. *Reused Waste*: Waste materials that are sent to a location off-site (e.g. another construction project or product supplier) where they are used in their original form (i.e. without additional processing).
- 1.4. *Recycled Waste*: Waste materials that are sent off-site to a recycling facility where they are used to displace virgin materials as feedstock for manufacturing processes that create new products.
- 1.5. *Landfill Waste*: Waste materials that are sent to a landfill site for disposal.

2. GENERAL

2.1. References

1. Ontario. Environmental Protection Act. Ontario Regulation 102/94: Waste Audits and Waste Reduction Workplans.
2. Ontario. Ministry of the Environment (MOE). A Guide to Waste Audits and Reduction Workplans for Construction and Demolition Projects as Required Under Ontario Regulation 102/94.
3. Ontario. Environmental Protection Act. Ontario Regulation 103/94: Industrial, Commercial and Institutional Source Separation Programs.
4. Ontario. Ministry of the Environment (MOE). A Guide to Source Separation of Recyclable Materials for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings as Required Under Ontario Regulation 103/94.
5. Canadian Construction Association. Standard Construction Document CCA 27-1997: A Guide on Construction Environmental Management Planning.
6. Canadian Construction Association. Standard Construction Document CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

7. Canada. Public Works and Government Services Canada. 2002 National Construction Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
8. CaGBC. "Materials & Resources Credit 2: Construction Waste Management". Leadership in Energy and Environmental Design Reference Guide for New Construction & Major Renovations (LEED Canada-NC Version 1.0). 2004.

2.2. Intent

1. Minimize the amount of solid waste (including land-clearing debris) generated by construction, renovation and demolition (CRD) activities.
2. Of the inevitable solid waste (including land-clearing debris) that is generated by CRD activities, divert more than 75% from landfill through reuse and recycling.
3. Comply with all applicable Environmental Protection Act of Ontario regulations relating to construction waste management including Ontario Regulation 102/94 and Ontario Regulation 103/94.
4. Comply with Canadian Construction Association's "Code of Practice" outlined in Standard Construction Document CCA 27-1997 to encourage improved waste management practices.

2.3. Description

1. The site superintendent shall be responsible for all aspects of Waste Management and Disposal.
2. Identify, implement & document measures to achieve waste management intent above.
3. Follow a strategy based on the 3R's hierarchy: Reduce the generation of waste materials at the project site, Reuse waste materials on other construction sites (when feasible) and Recycle waste materials as feedstock for manufacturing processes that create new products.
4. Waste Management and Disposal activities include arranging waste management service agreements with waste haulers and waste receiving facilities, supervising on-site waste management activities on a daily basis, coordinating waste management tasks with subcontractors to ensure timely and orderly progress of the work, preparing waste management documentation and submittals to summarize all shipments of waste materials from the project site, and reporting waste management progress to the Consultant.

2.4. Submittals

1. Construction Waste Management Plan for review and acceptance by the Consultant.
2. Documentation from each receiving facility to corroborate how waste was/or will be recycled/salvaged.
3. Waybills, invoices, letters and other documentation clearly indicating receiving facility, end use (reused, recycled or landfill) and quantity of waste for each shipment of waste generated on site.

3. MATERIALS, NOT USED

4. EXECUTION

4.1. Waste Reduction

1. Encourage suppliers & subcontractors to retrieve/retain packaging (i.e. skids, plastic wrap, etc.) for reuse.
2. Suppliers and sub-contractors shall provide a letter stating the item(s) will be reused and documenting the quantity removed from the site.
3. Prevent damage of materials due to mishandling, improper storage, and contamination.
4. Where possible, use prefabricated assemblies built at a central facility to avoid waste generation at the site.

4.2. Waste Diversion

1. Contact local salvaging/recycling facilities and arrange for recycling/re-use services. At a minimum, the proposed facilities must recycle/re-use land clearing debris, asphalt, concrete/masonry/stone, steel and other metals, wood (see note below), gypsum, cardboard, plastic, and "Blue Box" waste that will be generated throughout construction.
2. Use of material as landfill cover is not considered as recycling or reuse.
3. Incineration of wood waste for power generation is not considered as recycling or reuse.
4. Recommended measures for recycling/reusing wood include encouraging suppliers to reuse wood pallets, sending wood pallets to pallet recycling companies and converting waste wood into landscaping mulch.
5. Designate a central Waste Collection Area onsite that is dedicated to the separation and storage of all waste generated during construction. Provide containers in the Waste Collection Area that are sized to accommodate the separation and storage of expected waste types and quantities. Provide separate containers for each of land clearing debris, asphalt, concrete/masonry/stone, steel and other metals, wood, gypsum, cardboard, plastic, "Blue Box" waste (see note below), mixed waste, and other types (as required by salvaging/ recycling facilities).
6. Clearly indicate the material type being stored in each container using appropriate signage.
7. All subcontractors shall use the containers provided in the Contractor's established Waste Collection Area, or shall report to the superintendent the method of salvage, re-use or recycling used for material removed from site.
8. Follow the salvaging/recycling facilities' material acceptance requirements to ensure materials are properly sorted, grouped, and packaged for collection.
9. Provide "Blue Box" recycling bins near the construction trailer for recycling waste generated by site workers and visitors. Waste deposited in these bins shall include aluminium food or beverage cans, glass bottles and jars for food or beverages, PET bottles for food or beverages, steel food or beverage cans, and cardboard and paper products, or adhere to the local recycling program.

4.3. Waste Tracking: Coordinate delivery of separated materials to accepted salvage or recycling facilities.

- 4.4. Inspections and Maintenance: Conduct daily inspections of containers to check for and remedy cross-contamination. Promptly transport containers to receiving facilities when containers are full. Ensure the material type is clearly labelled on each container.

017700 CONTRACT CLOSEOUT

1. DEFINITIONS

- 1.1. *Deficiency* shall mean a contract requirement that is not yet performed and is required to be performed by the Work. This includes items present onsite but not yet put into operating condition. This includes items from both construction and related service requirements in the Work.
- 1.2. *Defect* shall mean a contract requirement that has not been performed to the standard required by the Contract, and is required to be re-performed, removed, or replaced. Refer to GC 2.4. In the alternative, and in accordance with GC2.3, the Owner may decide to deduct the difference in value of the item as performed (versus as required) from the Contract Amount.
- 1.3. *Warranty Item* shall mean a defect or deficiency to a contract requirement that has been installed and accepted and for which the Contractor, Subcontractor, Supplier and/ or manufacturer of the Product agree to maintain in, or restore to perfect condition for a specified period of time under the terms and Conditions of GC 12.3 Warranty as amended by the Supplementary Conditions.
- 1.4. *Ready for Use* shall mean that the whole of an intended improvement contemplated by the Contract is at the full service and disposal of the Owner in clean and operational condition for complete occupancy and/or use without any interference from the Contractor's operations that are required to finish the Work. The Consultant is under no obligation to certify any portion of the Work as Substantially Performed where other portions remain uncompleted.

2. GENERAL

- 2.1. The Work of this Section shall be in accordance with OGCA Document 100 - Take Over Procedures, in its latest edition, as issued by the Ontario General Contractors' Association, with CCDC Standard Construction Document CCDC2-2020, and with the requirements of Lien legislation applicable to the Place of Work.
- 2.2. The Contractor is specifically cautioned that the definition of Substantial Performance of the Work includes that the improvement under the Contract be ready for use, as defined above.
- 2.3. Responsibility for Inspection and Compliance with the Contract
1. Neither the Owner nor the Consultant are responsible for the issuance of extensive lists of defects or deficiencies. The Contractor shall effectively direct and supervise the Work so as to ensure conformity with the Contract Documents.
 2. The Contractor shall inspect the Work to ensure such compliance. The Contractor shall require such inspection from all Subcontractors and, where identified in the Contract, from Suppliers.
 3. Every effort shall be made by the Contractor to ensure that both defects and deficiencies are made good prior to an application for Substantial Performance. Any review to determine Substantial Performance will immediately be cancelled if it becomes obvious that any other than minor amounts of defects and/or deficiencies are outstanding.
 4. Submit required documentation such as statutory declarations, Workplace Insurance Certificates, warranties, certificates of approval or acceptance from regulating bodies at

application for Substantial Performance of the Work, and remaining outstanding items at application for final payment.

2.4. Partial Occupancy of Work not yet Substantially Performed

1. The Owner may elect to occupy the construction during a period after the agreed date for Substantial Performance as required by the terms of the Contract, but before actual attainment of Substantial Performance. Such occupancy shall not be deemed proof that the improvement is ready for use, nor shall Owner's occupancy mean acceptance of all or any item of the Work.
2. When partial occupancy of the uncompleted construction is required by the Owner as noted above, the Contractor shall co-ordinate Owner's use, requirements, access, and enjoyment with requirements to complete the Work. Perform all work and pay all costs for temporary protection and measures required to facilitate Owner's occupancy with minimal disruption to Owner's enjoyment.
3. Co-ordinate and schedule Contractor's and Subcontractor's cleaning-up and completion activities (including out-of-hours work if necessary) with Owner's moving-in of staff, furnishings, equipment, building accessibility, traffic, all to suit Owner's schedule and not disrupt Owner's productivity or enjoyment of the Project Site. Pay all costs for this work.

3. REQUIREMENTS FOR SUBSTANTIAL PERFORMANCE OF THE WORK

3.1. Review/Takeover Procedures

1. In accordance with OGCA Document 100, prior to application for certificate of Substantial Performance, carefully inspect the work and ensure it is complete, that major and minor construction deficiencies are remedied and/or corrected and the building is clean and in condition for occupancy. Notify the Consultant, in writing, of satisfactory completion of the Work and request a review. Include a complete list of any defects or deficiencies, taking care to distinguish between the two, and specifically identify proposals for correction or completion of each item.
2. During the Consultant's review, a further list of deficiencies and defects will be tabulated. Correct same at no expense to the Owner. Defects and deficiencies will be categorized as to whether they must be corrected prior to acceptance of the improvement as ready for use, whether they must be corrected during the period prior to finishing the Work, and their status with respect to warranties.
3. When the Consultant considers deficiencies and defects have been corrected to the extent required for the improvement to be ready for use, and it appears requirements for Substantial Performance of the Contract have been met, the Consultant shall issue a certificate of Substantial Performance.
4. The Contractor shall promptly advertise Substantial Performance in an accredited trade newspaper in accordance with the format and requirements of the Construction Lien Act, and shall submit evidence of the newspaper containing such advertisement. Pay all costs for this work.

3.2. Systems Commissioning

1. Prior to application for Substantial Performance of the Work, all equipment must have completed start-up procedures, be tested (including duration tests), be inspected and accepted by authorities having jurisdiction, and have installation certified as complete by the designated Commissioning representative assigned under Section 01810, as well as Supplier or manufacturer where this is a requirement of the Contract. Provide copies of tests, reports, and inspections with the application.

2. Prior to application for Substantial Performance of the Work, all Building Systems shall be fully functional, balanced, and accepted by authorities having jurisdiction, and certified complete by the entity responsible for performance of the Building System in accordance with its design intent under Section 019010. Provide copies of tests, reports, and inspections with the application.

3.3. Project Documents

1. Prior to application for Substantial Performance of the Work, submit documents requested for Project Close-out in accordance with Division 1 requirements, OGCA Document 100 procedures, and requirements as elsewhere indicated in the Contract Documents.
2. Submit draft hard copy of Project Documents for review and acceptance of Consultant and Owner. Revise and resubmit further drafts until such time as Project Documents are accepted.
3. Collect reviewed submittals and assemble documents executed by Subcontractors, suppliers, and manufacturers. Review and ensure correctness and completeness. Bind, organize, and complete documents in accordance with Division 1 requirements and as elsewhere indicated in the Contract Documents.
4. Provide warranties in final draft form, in the form prescribed by the Contract. Standard warranty forms are not acceptable except where explicitly stated in the Contract Documents.
5. Provide a complete list of Subcontractors and Suppliers, commissioning representatives, together with names and contact information for use during the Warranty Period.
6. Provide a complete and chronologically organized chart of warranty expiration dates.
7. Upon acceptance of draft Project Documents and Maintenance Manuals described elsewhere, provide three (3) hard copies of documents and one electronic read-only CD of Documents produced by scanning the completed and accepted hard copy documents to PDF format.

3.4. Final Cleaning

1. Immediately prior to application for Substantial Performance of the Work perform final cleaning as described elsewhere in the specification.
2. Immediately prior to application for Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for the performance of the remaining Work.

4. REQUIREMENTS AFTER SUBSTANTIAL PERFORMANCE OF THE WORK

4.1. General

1. After attainment of Substantial Performance of the Work as so certified by the Consultant, expedite completion of all other items required to finish the Work. Perform such work as necessary to complete the work promptly and in co-ordination with Owner's use of the Work.
2. Correct all defects, provide all deficiencies, and comply with all instruction for repairs or remedial measures to ensure that the requirements of the Contract are fully met.
3. There will be no certification for payment between Substantial Performance of the Work and issuance of final certificate for payment.

4. When the Work is complete, inspect the Work to ensure no items remain outstanding, and only then call for Consultant review.
5. Attend at such Consultant's review and take note of any items requiring completion as found by the Consultant. The Consultant will not make exhaustive review. If a significant number of items remain defective or deficient, the Consultant shall abandon the review and any subsequent reviews shall be paid for by the Contractor through deduction by the Owner of the cost of such reviews from outstanding Contract amounts.
6. Immediately upon receipt of Certificate of Substantial Performance, execute transition of Performance and Labour and Materials Payment Bond to warranty period requirements.
7. Immediately upon receipt of Certificate of Substantial Performance, provide warranties in accepted final form, fully executed and notarized. There will be no certification for payment between Substantial Performance of the Work and issuance of final certificate for payment.

4.2. The Lien Period

1. The Lien Period commencement, procedure and release of holdback monies will be in accordance with the Construction Lien Act, GC 5.5 as amended by the Supplementary Conditions, and the requirements of this Contract.

4.3. Systems Demonstrations

1. Immediately after attainment of Substantial Performance of the Work, schedule together with Owner demonstration of operation and care of each piece of equipment, in accordance with the requirements of Division 1 and as specified elsewhere in the Documents. Contractor's representative shall attend at these sessions.

4.4. Cleaning during the Period between Substantial Performance and Finishing the Work

1. Provide continuous cleaning as an integral part of all work operations during the intervening period between Substantial Performance and finishing of the Work, so that the completed portions of the Work are maintained to the standard identified and achieved at Substantial Performance. Provide temporary protection to a high standard so that cleaning operations to existing portions of the Work are minimized. Pay all costs for this work.
2. Just prior to the finish of the Work, remove any minor remaining surplus products, tools, construction machinery and equipment resulting from finish operations. Remove from site waste products and debris generated from remaining operations and recycle in accordance with environmental objectives and Contract. Perform final inspection to any portions of the Work affected by contract completion work, and do all things necessary to ensure finished Work is clean to standards specified.

5. REQUIREMENTS FOR FINAL PAYMENT

- 5.1. Submit a final statement certifying that the requirements of the Contract are completed and all defects and deficiencies corrected, except work required by the Contract specifically for the Warranty Period such as thermographic testing, maintenance contracts or inspections, or similar.
- 5.2. Submit a final application for payment giving total adjusted Contract Sum, previous payments certified and made, and monies remaining at time of application for final payment. Provide a breakdown of final change order amounts, status of allowances, and holdback payments.
- 5.3. Consultant will issue a final change order reflecting approved adjustments to Contract Sum not previously made.

6. REQUIREMENTS FOR WARRANTY PERIOD

- 6.1. Provide all services required by the Contract Documents for Warranty items in accordance with the General Conditions of the Contract as amended by the Supplementary Conditions. Provide these services promptly and diligently, using personnel fully familiar with the Work that has been performed and who have been involved in commissioning procedures.
- 6.2. Co-ordinate the services of Suppliers, manufacturers, subcontractors and others for the rectification of warranty items quickly and diligently.
- 6.3. Correct Warranty items immediately upon notification.
- 6.4. Prior to the expiry of warranty periods, schedule together with the Owner and Consultant an onsite review of systems and items covered by the specific warranty. Arrange for the attendance of Subcontractors and Suppliers where necessary or advisable. Attend the review and take action on identified items promptly.
- 6.5. Where the Contractor fails to take action with respect to Warranty items, the Owner may choose, without prejudice to its rights, to effect repairs or corrections as necessary in its sole opinion, and to deduct the cost of such repairs or corrections from any sum owed or held back from the Contractor. No such action shall void a warranty for the aspect of the Work or Facility so repaired by the Owner.

017780 WARRANTIES

1. GENERAL

- 1.1. Warranties and warranty periods shall be for a minimum 1 (one) year period following Substantial Completion and shall fully cover prompt correction of defects to materials, products, and installation at no cost to Owner, and as further specifically described in the Contract Documents.
- 1.2. The Contractor shall solicit on behalf of the Owner all Product warranties in excess of one year (Extended Product Warranties), but shall additionally ensure that all Products are covered with manufacturer or supplier warranties for at least a one year term. Extended Product Warranties shall be executed and submitted with the Record Documents.
- 1.3. Contractor is cautioned that all warranties covering the supply and installation of several products as an interrelated piece of the construction or forming all or part of a building system, and all warranties specifically requesting participation of the Contractor and/or Subcontractor, are not manufacturer warranties. These warranties are labour and material warranties to the Owner.
- 1.4. Warranties shall be submitted through the Contractor by each Subcontractor and each Supplier performing work. Form of warranty and requirements for execution vary with warranty. In general, warranties may be classified as follows:
 1. Contractor's one year warranty on the Work for all labour and materials;
 2. Subcontractors' one year warranties on aspects of the Work for all labour and materials;
 3. specifically requested Contractor's, Subcontractors', and Suppliers' warranties for extended periods on aspects of the Work;
 4. standard manufacturers' warranties on Products as offered by Product manufacturers and suppliers, offered to the benefit of the Owner, or Extended Product Warranties;
 5. specifically requested manufacturers' warranties for extended periods on Products.

2. SUBMISSIONS OF WARRANTIES

- 2.1. Provide warranties in the form prescribed herein, on company letterhead of the originating firm offering warranty, with specific areas for execution by all firms involved in the warranty.
- 2.2. Submit draft unsigned warranties for Owner's review with application for Substantial Performance.
- 2.3. All warranties shall specifically show the project, Owner, all firms involved, work covered, and period dated from Substantial Performance or acceptance of System or component if later.
- 2.4. Warranties shall be executed with original signatures of individuals with authority to bind the firm, with an underlying statement to that effect on the signing line. Warranties shall be duly notarized.
- 2.5. Contractor shall provide a completed list of all warranty expiration dates in chronological order for the Owner's use.

3. TERMS AND CONDITIONS

- 3.1. All warranties submitted to comply with requests for warranties in accordance with this Section shall be without any other terms and conditions, with the exception of a separate attachment regarding proper maintenance and servicing by the Owner. Such attachments must be accompanied with full maintenance and servicing instructions integrally attached to the warranty, or such qualification shall be null and void.
- 3.2. All standard manufacturers and suppliers Product warranties shall be submitted with complete terms and conditions and shall address the specific project noted, on company letterhead duly executed.

4. LABOUR & MATERIALS WARRANTIES

- 4.1. Warranties submitted shall read simply and solely as set out in the Sample Warranty Form provided by the Owner or Consultant.

5. STANDARD PRODUCT WARRANTIES

- 5.1. Submit standard product warranties on manufacturer or supplier letterhead specifically identifying the project and the Product warranted, together with all terms and conditions, and with duly authorized original signatures.

6. EXTENDED PRODUCT WARRANTIES

- 6.1. Submit extended product warranties specifically requested by the Contract Documents on manufacturer or supplier letterhead specifically identifying the project and the Product warranted, together with all terms and conditions fully in compliance with Contract Document requirements, and with duly authorized, notarized original signatures.
- 6.2. Extended warranties that are requested to be pro-rated, or to include for warranty of both material and workmanship shall specifically so state.

018010 COMMISSIONING AND PERFORMANCE VERIFICATION

1. DEFINITIONS

- 1.1. *Commissioning* shall mean the process and performance of services related to the construction and the Work that are specifically intended to adjust and optimise performance of a *Building System* and/or the relations among several or many *Building Systems* to exceed the quality and performance intent of a *Building System* or set of *Building Systems* required by the *Contract*. *Commissioning* shall be completed prior to hand-over to the Owner of the completed, functioning Work or portion of Work that is *Ready for Use* in the manner for which it has been intended, as inferable or evident from the *Contract Documents*. *Commissioning* is provided by the Contactor as an integral requirement of this Contract. The Owner, Consultant, and Owner's Third Party Commissioning Consultant shall provide oversight and witness to the commissioning, and instruction and clarification regarding performance verification, but do not perform commissioning or operation of any system.
- 1.2. *Start-up* shall mean initial start of a particular component that forms part of a *Building System*. Each component requires *Start up*. *System Commissioning* may not commence until all components have been individually started and all defects and deficiencies identified at the *Start-up* have been rectified.
- 1.3. *System Commissioning* shall mean initial start, adjustment, and optimization of a particular individual *Building System* to achieve and verify achievement of the required quality and performance intent for the *Building System*. Each *Building System* requires *System Commissioning*. *Final Commissioning* may not commence until all *Building Systems* have been individually commissioned and all defects and deficiencies identified at the system commissioning have been rectified.

Submissions, rectification of deficiencies or defects, inspecting, balancing, and testing of equipment and systems are all part of the commissioning process that occurs prior to Substantial Performance of the Work.

- 1.4. *Final Commissioning* shall mean that part of the commissioning process that occurs after achievement of *System Commissioning* for all *Building Systems* that are interrelated to the *Building System* receiving *Final Commissioning*. *Final Commissioning* includes *System Commissioning* of any Building Automation or Monitoring System existing in the *Facility* or present in the *Work*.
- 1.5. *Building System Workshop* shall mean the project meeting(s) prior to Submittals as set out herein and in Sections 013010 and 019010.
- 1.6. *System Commissioning Workshop* shall mean the project meeting(s) prior to *Start-ups* as set out herein and in Sections 013010 and 019010.
- 1.7. *Owner's Third Party Commissioning Consultant* shall mean a consultant under direct contract to the Owner that shall witness the commissioning process on a sampling basis and report results of such reviews and witnessing to the Owner for the Owner's purposes. The Third Party Commissioning Consultant's function and duties for the Owner shall in no way detract from the responsibility of the Contractor, the Contractor's Commissioning Co-ordinator, each Trade Contractor responsible for a system, and the Trade Contractor's System Commissioner for the commissioning and performance verification.
- 1.8. *Commissioning Co-ordinator* shall mean the individual in the direct employ of the Contractor and as further set out in Section 019010 Building Systems.
- 1.9. *System Commissioner* shall mean the individual in the direct employ of the Contractor or Trade Contractor to whom responsibility for system verification and performance has been assigned as further set out in Section 019010 Building Systems and the appended List of Systems.

2. INTENT

- 2.1. Upon commencement of the Work, for each building system in the Work, and in accordance with Section 019010, the Contractor shall identify an authorized representative of the Contractor acting as a commissioning agent on behalf of the Contractor, Subcontractors, and Suppliers responsible for the specific system to be installed, who shall perform the following duties throughout the term of the Contract and Warranty Period:
1. review the Contract Documents and attend pre-installation meetings, and ascertain knowledge of the design intent of the building system and the relation and function of its parts;
 2. review all submissions under the Contract pertaining to the building system and require revision and resubmission of such accept such submissions as complying with Contract requirements, prior to submission of submittal to Consultant;
 3. review the training and level of expertise of the lead hand tradesmen nominated to perform installation work for the system and its parts, and accept their fitness for such work; provide liaison and instruction to those performing installation work, including liaison to Product and Material suppliers;
 4. Co-ordinate and direct the preparations for the System Commissioning Workshop for the system in the Work for which he or she is responsible, and be present at component Start-up, System start-up and Commissioning and Final Commissioning and review system performance during initial operation;
 5. attend the location of installation at a suitable point in the progress of the Work so as to provide instruction to the Contractor, the Subcontractor, and the accepted installation workforce as to the recommended installation of the Product and system;
 5. Inspect the system installation and ensure it is installed in accordance with recommendations;
 6. be present at system start-up and review system performance during initial operation;
 7. co-ordinate balancing of the system for optimal performance in each seasonal condition, or to agreed year-round parameters;
 8. provide operation, maintenance, and inspection training to the Owner's staff; and
 9. provide trouble-shooting and problem diagnosis, and ensure correction of defects during the Warranty Period.
- 2.2. The Commissioning Co-ordinator and the System Commissioners shall co-operate with the Owner, Consultant and any testing and inspection agencies retained separately by the Owner, and shall be fully qualified for the duties intended. No inspection, review or testing by the Owner or Consultant shall detract from the duties and contract requirements for commissioning and performance verification by the Contractor and the responsible Subcontractors.
- 2.3. The Contractor shall submit a complete list of the System Commissioners for review and acceptance with the first application for payment under the Contract, together with a letter from each that acknowledges acceptance of the duties set out in this Section and Section 019010. The Owner is under no obligation to process any payment under the Contract in the absence of such Submittal and its acceptance by the Consultant.
- 2.4. All costs for work described in this Section and elsewhere in the specifications as relating to startup, balancing, commissioning, and training are at the Contractor's expense and are included in the Contract Price.

3. SUBMITTALS

- 3.1. The system commissioner for each building system shall inspect submittals to ensure the system components and equipment being supplied conform to the Contract and are consistent with the system performance intent and the required commissioning functional performance test procedures. If not in conformance, the System Commissioner and the Commissioning Co-ordinator shall ensure that the variances are acceptable to the Team, and that commissioning checklists are revised accordingly.

4. STARTUP AND COMMISSIONING

4.1. Review of Contract Requirements and Submittals

1. Prior to confirmation of Product orders by the Contractor or any Subcontractor or Supplier, the system commissioning representative shall review the Contract Documents and project requirements with the Contractor's and Subcontractor's staff. Submit to the Consultant a record of this review.
2. The System Commissioner shall review and accept at a minimum "reviewed as noted" the submittals for all equipment, Products and systems materials applicable prior to forwarding to the Contractor for review. Failure to diligently review may result in a finding of Defective Work and re-review by the Consultant at Contractor's expense.

4.2. Building System Workshop Prior to Commencement of Work for a Building System

1. For each Building System in the Work, the Contractor's Commissioning Co-ordinator shall organise and co-ordinate a workshop session with the Consultant and the system designer, and all representatives of manufacturers of equipment in the system, the System Commissioner and all technicians and representatives of all Subcontract and Supplier entities involved in the chain of supply and the installation for components in the system or control of such equipment.
2. The workshop shall be of sufficient duration to thoroughly discuss and explore all aspects of the Building System's design, performance intent, and contract requirements, and to resolve all identified or perceived conflicts among scheduling, supply, installation, commissioning, and performance.

4.3. The System Commissioner's Inspection of Installation

1. The System Commissioner representative shall assist with any adjustment, balancing, levelling, or other procedures in order to ensure proper installation of material and product portions of the System, and shall instruct the Owner's nominee in such techniques during training.
2. Provide instruments required for testing, adjustment, and flushout operations to portion of systems requiring same prior to startup of equipment pieces, and perform such operations. Ensure that ducting, piping or other portions of system to be later concealed and/or connected to pieces of equipment are tested against failures (pressure, leakage, vibration or other defect) and are properly installed free of defect prior to Contractor or other trades covering such work.
3. Accurately record data relating to electrical and temperature performance of Product where applicable.
4. Report to Consultant any deficiencies or defects noted during installation.
5. Take photographic record of all portions of systems that will be covered in the finished Work, and submit photographs to Consultant each month showing progress of the installation. Provide electronic versions of photographs for use by the Contractor in assembling Record Documents. See Section 018040.

4.4. Systems Commissioning Workshop

1. For each Building System present in the Work, the applicable System Commissioner shall, prior to start up of any piece of equipment in a Building System, organise and co-ordinate a System Commissioning Workshop.
2. The workshop shall be of sufficient duration to thoroughly discuss and explore all aspects of the system as installed to date, all procedures for equipment start-up and commissioning, and to resolve all identified or perceived conflicts among scheduling, supply, installation, commissioning, and performance.
3. Attendance and participation at the commissioning workshop for each system is mandatory for the Contractor's Commissioning Co-ordinator, the nominated Systems Commissioner for the System, and shall be attended by representatives of the Owner (Owner's personnel, Consultant, system designer, and Owner's Third Party Commissioning Consultant).

4.5. Start-up of System Components, Equipment, and Sub-Systems

1. The systems Commissioner for the Building System shall be present during work for start up testing and duration testing to satisfy that each equipment piece in the System is fully functional for the intended use, service conditions, and life expectancy.
2. Provide advance notification of all proposed start-ups to Consultant and Owner's Third Party Commissioning Consultant. Ensure that all Functional Performance Tests and Checklists for installation and initial startup are available for use at start-up.
3. The Systems Commissioner shall start each piece of equipment or manufactured subsystem individually. Perform this work in the presence of the manufacturer's representative and the installer and perform all start up checks and remedy all individual equipment and installation defects and issues. Balance, test, and approve individual component performance prior to any System Commissioning of the system as a whole. This includes verification of connections and basic wiring, valves, and communication protocols. Provide all temporary measures to operate or verify components of the System without overall operation of the System.
4. Complete all checklists and performance all component FPT's successfully, and record for submission. Record all trials, including failures, in the system issues log.

4.6. Systems Commissioning

1. Be present during work for first trial runs of systems, and for balancing of systems and duration testing to satisfy that the system is fully functional for the intended use, service conditions, and life expectancy. Begin commissioning of systems in isolation from all other systems. After remedying all defects to system and equipment pieces from first runs of system, begin trial runs of systems in tandem and in coordination with other systems. Balance systems in isolation wherever possible, to isolate issues and problems, and provide final balance only after all systems likely to influence the operation of the system are functioning. Perform final trial runs of systems during several periods of different weather and conditions wherever possible. Provide such further commissioning work as required to evaluate systems that are largely influenced by change of season, during warranty period and at no cost to Owner.
2. Start each system individually and perform all checks and remedy all individual equipment and installation defects prior to commencing any systems commissioning.
3. Perform commissioning in strict conformance with further requirements of energy usage, sustainability, and optimisation objectives in order to attain certification of systems, and LEED procedures where applicable.
4. Complete all checklists and performance all internal system FPT's successfully, and record for submission. Record all trials, including failures, in the system issues log.

4.7. Reporting

1. Prior to application for Substantial Performance of the Work, the System Commissioner and the Contractor's Commissioning Co-ordinator shall issue a report accepting procedures and the completed component and/or building system installation. Include raw-data and results of all tests performed, including failures, and include all completed checklists and Function Performance Tests of the System. Provide final copy of issue logs with entries of all tests and issues tracked and that status of each is resolved.
2. The issued report shall state that the installation of the Building System and/or Product is in conformance with the System Commissioner's recommendations, and shall not impede the performance of the System or its ability to exceed the requirements of this Contract. The report shall discuss and make recommendations for particular use requirements applicable to service conditions present in the completed Work.

5. FINAL COMMISSIONING

- 5.1. Upon resolution of issues and optimization of performance within an individual system, proceed to a final commissioning stage for the system. Provide all work and services to liven all external connections to other systems and perform Functional Performance Tests that verify performance relationships where the system issues instructions or controls performance of aspects of other systems, or where the system receives input from or provides output to another system.
- 5.2. Provide all work and services to verify performance of the system in each sequence of operation and seasonal condition that forms part of the conditions of service for the system.
- 5.3. Complete all checklists and performance all external system FPT's successfully, and record for submission. Record all trials, including failures, in the system issues log.

6. OPERATION AND MAINTENANCE TRAINING

- 6.1. Immediately after achieving Substantial Performance of the Work, schedule maintenance and training sessions together with the Owner's operations and maintenance forces. The Contractor's representative shall provide instruction to the Owner's nominees or own forces, using the Manuals specified elsewhere in the Documents and previously delivered, regarding recommended care, operation, inspection, adjustment, and maintenance for the System and components in service. Allow for timing and duration of visits to suit Owner's representative's scheduling & requirements.

7. WORK DURING WARRANTY PERIOD

- 7.1. Provide on-going review and attendance to building call-back, maintenance, and repair problems during the warranty period for the equipment or system for which the representative is responsible. Pay all costs for this service.
- 7.2. System performance during other seasons than the season in which facility occupancy and hand-over to Owner Ready for Use shall be accomplished through forced Functional Performance Test and simulation wherever possible. Provide all such testing. Where performance during off-seasons cannot be properly simulated, and in all cases for HVAC systems, provide further services and perform further work during the Warranty Period to commission and verify performance of the system in each off-season, as directed by the Owner's Third Party Commissioning Consultant.
- 7.3. The Systems Commissioner and the Commissioning Co-ordinator shall provide further reporting and submission to the Consultant and Owner's Third Party Commissioning Consultant showing verification of system performance to each applicable season.

018040 RECORD DOCUMENTS

1. PHOTOGRAPHIC RECORD

- 1.1. The Contractor shall photographically record the Work as the construction progresses. Photograph a representative sample of aspects of the Work accomplished that have been covered as of the date of the application.
- 1.2. The photographic record referenced above shall be more extensive for the particular building systems identified in Section 019010, so that the Owner has a complete photographic record of the portions of the building system that are concealed in the finished Work, including but not limited to under-slab conduit and services, equipment and services within ceiling areas, and systems within shafts and service spaces.

2. AS-BUILT AND RECORD DOCUMENTS

- 2.1. From the electronic format contract set provided by the Owner in accordance with the Contract, print sets of Documents for rough record drawing purposes. Maintain one set at job site to be used for as-built notations only. Maintain a second set offsite for use as backup.
- 2.2. On one set record accurately deviations and changes from Contract Documents as Work progresses. Failure to keep the rough set current shall be grounds for a finding of defective work under the General Conditions, and shall result in a removal of Contract Amounts from the Contract that the Consultant deems are associated with this requirement of the Work and Contract.
- 2.3. The Contractor marks changes neatly in red ink at regular meetings of site superintendent and trade contractor foremen convened for this purpose.
- 2.4. Reserved.
- 2.5. Review status of the rough as-builts prior to each site meeting. Report status and present set for review at meeting. Failure to present set shall be grounds for delay of Contractor's claim for payment.
- 2.6. Prior to application and Consultant's review for Certificate of Substantial Performance, inspect as-builts to ensure that all changes to the Work have been noted. Neatly transfer notations to the second set (the Record Drawings) and submit both sets to Consultant for review and acceptance.
- 2.7. Upon acceptance of the Record Drawings, pay for and obtain an electronic AutoCad version of the drawings in a format acceptable to the Owner, and arrange and pay for transferring of all changes (including for change orders), notes, and marks from the record drawings to the applicable electronic copies of the drawings. As built drawings are to be submitted in AutoCad format. Submit 3 (three) sets of CD discs to the Owner for its ownership, copyright, and unlimited use. Pay all costs for this work and be responsible for contents of record documents.
- 2.8. Non-performance of this Work within two months of achievement of Substantial Performance of the Work shall be grounds for the Owner to contract and obtain such documents from another party and deduct their cost from the Contract Price.
- 2.9. Six weeks prior to Substantial Performance, and upon request, the Consultant will provide to the Contractor with DWG versions of the Tender issue drawings, for Contractor's use in producing as-built and record documentation.

018050 MAINTENANCE MANUALS

1. BASIC REQUIREMENTS

1.1. Provide an interactive PDF of Maintenance Manuals formatted as follows:

1. Cross-referenced pdf format including electronic table of contents and search functions, using pdf format of all Submittals. No scanned copies of data or submittals shall be allowed.
2. Enclose title sheet, labelled as applicable, project name, date and list of contents.
3. Organize contents into applicable Building Systems identified in Section 019010. For items that do not clearly form part of a Building System, provide further organisation of pdf document in accordance with sections of the specifications, clearly tabbed.
4. When only one PDF document is required, a complete index shall be provided. When more than one file is required, the first file shall contain a complete index of all files and each succeeding file shall contain an index denoting its own contents. Files shall be clearly titled and identified.

1.2. Before making application for Substantial Performance of the Work and at minimum 4 weeks prior to handover of the Work to the Owner, submit to Consultant a rough draft of the Maintenance Manuals, consisting of items noted in this section and as requested elsewhere in the Contract Documents, in English, as follows:

1. Interactive PDF of all submissions
2. Maintenance instruction for finished surfaces and materials.
3. Copy of hardware and finish schedules.
4. Description, operation and maintenance instructions for equipment, and parts lists. Indicate specific nameplate information such as make, size, capacity, and serial number for Product or Material.
5. Names, addresses and phone numbers of all subcontractors and suppliers.
6. Additional material used in project listed under various Sections showing name of manufacturer and source of supply.
7. Charts, diagrams & equipment reports identified in mech., elec. and general notes to Drawings,
8. Provide spreadsheet of maintenance items on a daily, monthly, quarterly and yearly basis.
9. Copies of all building system reporting and certifications.
10. Copies of all system tests for building systems.
11. Copies of warranties pertaining to the item.

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

1.4. Maintenance Manuals must be fully available to the Owner and accepted by the Consultant before the Consultant will consider Completion of the Contract.

1.5. Within a period of four (4) weeks prior to the completion date of the project, or designated date of the system takeover by the Owner, (providing the Maintenance Manuals are available) the Owner's

maintenance personnel shall be allowed on the site to familiarize themselves with the equipment and Systems and witness commissioning activities if so requested.

018060 MAINTENANCE MATERIALS

1. GENERAL

- 1.1. Provide all overage, extra stock, and maintenance materials prior to application for Substantial Performance of the Work. For required materials, see this Section as well as other portions of Specifications and notes on Drawings and Schedules. Deliver to a location and at a time specified by the Owner, and as follows:
 1. Use unbroken cartons, or if not supplied in cartons, material shall be strongly packaged.
 2. Clearly mark cartons or packaging as to contents, project name, and supplier.
 3. If applicable give colour and finish, Room No., or area where material is used.
2. Contractor replaces at own expense any incorrect or damaged maintenance materials delivered to Owner, including damage during shipment or unloading.

2. MAINTENANCE MATERIALS

- 2.1. This Contract includes the supply of all materials intended to be consumed by the operation, use, and enjoyment of the finished Work by the Owner for the first year of intended service use, as well as further specific materials noted herein.
- 2.2. The Contractor, Suppliers, and all Subcontractors shall thoroughly review the Products and Materials supplied as a portion of the Work, and shall provide any and all materials necessary to maintain the Work in accordance with warranty requirements, good maintenance practice, and as further described in Suppliers' written recommendations for maintenance in the Maintenance Manuals. The sole exception to this requirement is for cleaning products and surface treatment products for finishes that may reasonably be expected by the Owner to be consumed in the course of janitorial duties.
- 2.2. Provide at a minimum the following maintenance materials, and include for these materials in the Contract Price:
 1. A one year supply of all maintenance materials above-noted, and at a minimum
 2. one extra set of each type of filters for fixtures, system components, or equipment;
 3. one set of replacement belts for all equipment using same;
 4. one extra electrical battery of all types used in the finished Work;
 5. one 4 litre container of each colour and type of paint used in the finished Work;
 6. extra set of all special tools required for maintenance work to equipment; and
 7. one 4L container of each flooring or maintenance finish used in sealing and finishing; and
 8. other maintenance materials as specified elsewhere in the specification. Continuous and unused overage of each type of wall base, sheet flooring, ceramic tile, or other similar finish equivalent to 5% of area used in the finished Work.

018080 INDOOR AIR QUALITY (IAQ) REQUIREMENTS

1. GENERAL

- 1.1. The site superintendent (or other person designated by the Contractor acceptable to the Consultant and Owner) shall be responsible for all aspects (during construction) related to indoor air quality management.

2. DEFINITIONS

- 2.1. *Volatile Organic Compounds (VOCs)*: Organic chemicals that produce vapours readily at room temperature and normal atmospheric pressure (e.g. gasoline, solvents, etc.). VOCs react with sunlight and nitrogen to form ground-level ozone, a chemical that has detrimental effect on human health, agricultural crops, forests, soil, groundwater and ecosystems.
- 2.2. *Carpet and Rug Institute (CRI) Green Label*: a program established by the national trade association representing the carpet and rug industry to identify carpet products that have been tested by an independent laboratory and have met the criteria for low VOC emissions.
- 2.3. *Urea-Formaldehyde (UF)*: A combination of urea and formaldehyde the readily decomposes at room temperature. It is found in some glues/resins used to manufacture furniture, composite woods (e.g. particle board), agri-fibre products and laminated assemblies. UF has detrimental effect on human health and may include symptoms such as eye, nose, and throat irritation, wheezing and coughing, fatigue, skin rash and severe allergic reaction.
- 2.4. *Agrifiber*: recovered agricultural waste fibre, from sources including but not limited to cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks and agricultural prunings, that are processed and mixed with resins to produce products with characteristics similar to those derived from wood fibre.

3. SUBMISSION REQUIREMENTS

- 3.1. Submit in accordance with Division 01 confirmations regarding selected Products for their potential effect on Indoor Air Quality during the construction period and upon handover of the Facility to the Owner Ready for Use.
- 3.2. Submit IAQ Management Inspection Log. Produce such log for review upon request of Consultant.

4. BASIC PRODUCT REQUIREMENTS

- 4.1. All adhesives and sealants that are applied onsite and fall within the building weather barrier must have a VOC content less than the limits of the State of California's South Coast Air Quality Management District (SCAQMD) Rule 1168. Please note that specific VOC Limits are stated within individual specifications.
 1. The VOC content limits of SCAQMD Rule 1168 are as follows:

| Architectural Adhesives | VOC Limit (g/L) |
|----------------------------|-----------------|
| Wood Flooring Adhesive | 100 |
| Subfloor Adhesive | 50 |
| Ceramic Tile Adhesive | 65 |
| Drywall and Panel Adhesive | 50 |
| Cove Base Adhesive | 50 |

2. For the following substrate specific adhesives stated VOC limits shall not be exceeded:

| Substrate Specific Adhesives | VOC Limit (g/L) |
|--|------------------------|
| Plastic Foam Adhesive | 50 |
| Porous Material (except wood) Adhesive | 50 |
| Fibreglass Adhesive | 80 |

3. Upon request, submit supporting documentation for all adhesives and sealants that are applied onsite and fall within the building weather barrier.

- 4.2. All paints and coatings that are applied onsite and fall within the building weather barrier must have a VOC content less than the limits of Green Seal Standards GS-11 and GC-03 and the State of California's South Coast Air Quality Management District (SCAQMD) Rule 1113.

1. The VOC content limits of Green Seal Standard GC-03 are as follows:

| Anti-Corrosive Paints | VOC Limit (g/L) |
|----------------------------------|------------------------|
| Anti-Corrosive Paint, Gloss | 250 |
| Anti-Corrosive Paint, Semi-Gloss | 250 |
| Anti-Corrosive Paint, Flat | 250 |

2. The VOC content limits of SCAQMD Rule 1113 are as follows:

| Coatings | VOC Limit (g/L) |
|---|------------------------|
| Bond Breaker | 350 |
| Clear Wood Finish, Varnish | 275 |
| Clear Wood Finish, Sanding Sealer | 275 |
| Clear Wood Finish, Lacquer | 275 |
| Clear Brushing Lacquer | 275 |
| Concrete-Curing Compound | 350 |
| Dry-Fog | 400 |
| Fire-Proofing Exterior Coating | 350 |
| Fire-Retardant Coating, Clear | 650 |
| Fire-Retardant Coating, Pigmented | 350 |
| Flat Coating | 100 |
| Graphic Arts (sign) Coating | 500 |
| Industrial Maintenance Coating | 100 |
| High Temp Ind Maintenance Coating | 420 |
| Magnesite Cement Coating | 450 |
| Mastic Coating | 300 |
| Metallic Pigmented Coating | 500 |
| Multi-Colour Coating | 250 |
| Non-Flat Coating | 50 |
| Pigmented Lacquer | 275 |
| Pre-Treatment Wash Primers | 420 |
| Primer, Sealer and Undercoating | 100 |
| Quick-Dry Enamel | 50 |
| Quick-Dry Primer, Sealer & Undercoating | 100 |
| Rust Preventative Coating | 100 |
| Shellac, Clear | 730 |
| Shellac, Pigmented | 550 |
| Specialty Primer | 100 |
| Stains | 250 |
| Stains, Interior | 250 |
| Wood Preservative, Below-Ground | 350 |
| Wood Preservative, Other | 350 |
| Low-Solids Coating | 120 |

3. Upon request, submit supporting documentation for all paints and coatings that are applied onsite and fall within the building weather barrier.
- 4.3. Upon request, submit supporting documentation for all carpet systems used in the building, to show conformance with VOC and off-gassing limits as required by Specification Section 096800.

5. AIR QUALITY CONTROL DURING CONSTRUCTION

- 5.1. Schedule construction activities to minimise the amount of VOC's, odours and fumes absorbed by porous materials (e.g. ceiling tiles, carpet, etc.).
- 5.2. Complete applications of wet and odorous materials such as paints, sealants, and coatings before installing absorbent "sink" materials such as ceiling tiles, carpets, and fabric-covered furnishings.
- 5.3. Identify potential sources of indoor air pollutants on the construction site. Any construction activity or material that produces odour and/or dust is considered a source of air pollutants. Pollutant sources include, but are not limited to:
 1. Materials that produce detectable odour including but not limited to: paints, coatings, grouts, stains, adhesives, epoxy flooring, sealants, caulking, solvents, pesticides, fuels, and cleaning products.
 2. Materials that create dust, including but not limited to: concrete products, drywall, wood products, acoustic ceiling tile, insulation, and ceramic tile.
 3. Equipment that emit products of combustion or create odour and/or dust, including but not limited to: generators, compressors, cutting tools/saws, torches/welders, vehicles, and portable heaters.
 4. Construction activities that disrupt pollutants such as: demolition, repair, or renovation.
 5. Other: exterior site work, standing water, tobacco smoke.
- 5.4. Minimise pollutants generated inside the building from the sources identified in this Section using the following measures:
 1. Prohibit smoking inside the building at all times.
 2. Fuel up equipment outside the building only.
 3. Store gasoline and solvents outside the building only.
 4. Restrict vehicular traffic and equipment operation from near entrances and air intakes.
 5. Reduce on-site emissions using equipment that is powered by electricity.
 6. Exhaust pollutant sources directly to the exterior using temporary or permanent ventilation equipment. Where exhaust is not feasible, re-circulate through air cleaner.
 7. Collect and bag sawdust from woodworking tools.
 8. Cover and/or seal all indoor sources of odour and dust.
 9. Use painting techniques that minimise odour (e.g. roller instead of spraying).
 10. Use cleaning practices that minimise dust (e.g. vacuum instead of sweeping).
 11. Use cleaning products that minimise pollution, fumes, VOC's, etc.

- 5.5. Prevent the movement of pollutants from the sources identified in this Section to other areas in the building.
- 5.6. Prevent the accumulation of moisture, dust and dirt in the building from the sources identified under article 5.3.
- 5.7. Protect HVAC Systems as follows:
 1. Before & during installation:
 1. Cover with plastic and elevate off of ground, all ductwork, fittings, insulation, acoustic lining and equipment stored on site during construction.
 2. Seal all supply, return and exhaust openings as well as all temporary ductwork openings not under immediate work (e.g. open ends in ductwork runs) with plastic. Openings must be sealed immediately after installation in areas that will no longer be under work.
 3. Close/cover all hatches and access doors in HVAC equipment that will not be under work.
 4. Seal all HVAC equipment openings (e.g. inlets/outlets of air handlers, fans, VAV boxes, etc.) with plastic until ductwork is connected.
 5. Do not use mechanical rooms to store or collect construction waste materials.
 6. Install ceiling tiles and seal all openings into the plenum with plastic prior to final cleaning.
 2. After Installation:
 1. Do not use mechanical rooms to store or collect construction waste materials.
 2. Do not operate any permanent HVAC equipment or systems during construction.
 3. Seal all openings in HVAC systems, ductwork and plenums as described above.
 4. If an HVAC system protection measures are not implemented, or if the system is operated during construction, the Contractor must provide duct cleaning services, plus all necessary access doors, at no extra cost to the contract.
 3. After all construction and final cleaning work is complete:
 1. Remove all HVAC protection measures.
 2. Install new filters in all air handling equipment.
 3. Start-up all systems.
 4. Prepare systems for Testing, Adjusting and Balancing, and System Commissioning
- 5.8. All products/materials installed as a part of indoor air quality management measures shall be removed prior to building handover. Any remedial work required as a result of removing the measures is the responsibility of the Contractor. Perform such work promptly, with safeguards for continued achievement of air quality standards.
- 5.9. Inspections and Maintenance
 1. The Contractor shall inspect all indoor air quality management measures and remedy any deficiencies on a weekly basis.
 2. Inspections shall be recorded in an IAQ Management Inspection log and shall denote the measures implemented at the time of inspection, any deficiencies as well as corrective actions taken.
 3. All Pollutant Containment, Housekeeping and HVAC protection measures will be reviewed by the Consultant during each site visit.
 4. The Contractor shall clean or replace any equipment or materials that are incorrectly stored or improperly protected at no cost to the Owner.

6. BUILDING FLUSH-OUT REQUIREMENTS

- 6.1. After all construction, final cleaning, Testing, Adjusting and Balancing, and Systems Commissioning work is complete to areas under the Contractor's control, perform a building flush-out.
- 6.2. Prior to commencement of building flush-out Contractor shall:
 1. Perform all corrective work related to deficiencies.
 2. Ensure new filters are installed in all air handling equipment.
 3. Flush-Out requirements prior to Occupancy:
 1. Maintain a minimum temperature of 16°C (60°F).
 2. Where mechanical cooling is operated, maintain a relative humidity no higher than 60%.
 3. The Contractor shall carry-out building flush-out measures for a minimum period of 14 days, operating such that 1 million litres of outdoor air are supplied to the space for each square metre of space prior to occupancy hand-over.
 4. Flush-out requirements during Owner Move-in:
 1. Maintain a minimum indoor temperature of 16°C (60°F).
 2. Where mechanical cooling is operated, maintaining a relative humidity at max. 60%.
 3. The Contractor shall carry-out building flush-out measures for a min. period of 7 days.
 5. Flush-out requirements after Occupancy
 1. Supply outside air at a minimum rate of 0.045m³/minute/m² (0.15 cfm/ft²) for at least three hours prior to each time the building is occupied.
 2. Supply outside air at the greater of 0.045m³/minute/m² (0.15 cfm/ft²) or the design minimum outside air supply during times when the building is occupied.
 3. Continue the flush-out process described above until 3 million litres of outdoor air per m² has been supplied to the building as measured from occupancy handover.
 6. Replace all filtration media in air handling equipment with new filters after the building flush-out is completed. Set all building operation to required normal occupied, non-occupied timetable and parameters.
 7. Building Flush-out is a minimum requirements of the Contract, and in no circumstances shall be substituted by air quality testing in lieu of flush-out. Plan and achieve the construction schedule and Contract Time to include the required flush-out periods.

7. IAQ TESTING REQUIREMENTS

- 7.1. IAQ testing will be performed prior to occupancy of building where Owner doubts the quality of the IAQ measures and flush-out work undertaken. Cooperate with all such testing. The Commissioning Co-ordinator shall attend the testing.
- 7.2. Such indoor air quality testing will be carried out by and at the expense of the Owner. Costs for retesting upon failure to achieve performance is at the Contractor's expense.
- 7.3. The Contractor shall allow 3 days after all construction and final cleaning work is complete and prior to building occupancy for the Owner to conduct indoor air quality testing.
- 7.4. The Contractor shall perform all corrective work related to general deficiencies, Testing, Adjusting and Balancing, and Commissioning of Systems prior to indoor air quality testing, and shall notify the Consultant that the Work is ready to meet indoor air quality requirements for occupancy.

019010 BUILDING SYSTEMS REQUIREMENTS

1. DEFINITION

- 1.1. A *Building System* is defined in accordance with the modifications to Definitions in the Contract as an interrelated set of materials and Products provided in accordance with the requirements of the Contract and intended to ensure a particular performance during the expected service life of the Facility. This performance may include specific norms that form Contract requirements for capacity, resistance, soundness and integrity, compatibility, safety, longevity, and other factors that result from the achievement of the intended system design through the work of the Contractor.
- 1.2. *Control* is hereby defined as the method by which the operation of a *Building System* component, set of components, or the overall system (as the circumstance warrants) is attained, this includes the required performance of that component, set of components, or system that produces the functions necessary to achieve the design intent of that Building System in its anticipated service life, including its contribution to the performance of other Building Systems.

The Contractor is specifically cautioned that this Contract requires complete control of all Building Systems, whether existing, altered, new or affected by this Contract. All product, material, and work required to achieve such control is included in the Contract Price and Contract Time. *Controls* shall be read with an equivalent meaning. *Controls* may be achieved through a variety of means as specifically set out in the Documents and as inferable from the required sequences of operation of the systems. The Contractor and all Trade Contractors are specifically cautioned that neither a system of energy management, building monitoring, nor building automation, nor a rough-in for such a system, nor a requirement that systems equipment be compatible or contain features for such system, shall replace the contract requirement for control of all systems to achieve their intended performance.

2. COMPONENTS OF BUILDING SYSTEMS

- 2.1. In general, each building system consists of components that work together as an integrated whole to ensure the accomplishment of the functions and performance requirements of the system. The components are generally grouped into the following categories:
 1. Devices ("end of line" items delivering performance, such as lights, diffusers, or similar)
 2. Pathways, conduits, pipes, and similar conductive components.
 3. Supports for components to the building structural system or otherwise as allowed
 4. Equipment performing actions and processes, or providing circulation or other function. This may include subsystems (such as a chemical feed system on a hydronic system)
 5. Accessories, appurtenances (that monitor, supervise, instruct and control the components of the system in relation to one another) and media which forms the conducted component (water, electricity, air, for instance)
 6. External Connections that connect aspects of the system or its components to other systems (for instance, a supervisory flow switch on a sprinkler system, that communicates to the fire alarm system).
- 2.2. The systems specification sections are organised to clarify these components, and the external connections to the systems, to assist in co-ordination of the ways and means for accomplishing the work to the systems required by the Contract.

3. ORDER OF PRECEDENCE OF SYSTEMS

- 3.1. The order of precedence of Building Systems in the layout and routing of systems within the Work is generally as follows. Conform to this hierarchy unless specific acceptance is given by the Consultant.
1. Relationships of systems dictated by statute or code (such as relationship of potable water piping and sanitary piping in trenches) over
 2. Structural System takes precedence over,
 3. location of systems in exposed surface locations over,
 4. location of non-pressurised liquid systems functioning by gravity, over
 5. pressurised liquid systems requiring maintenance drainage, over
 6. pressurised air distribution systems, over
 7. pressurised liquid and gas systems, over
 8. electrical distribution systems, over
 9. telecommunications and data distribution systems.
- 3.2. Code required systems of fire separation and egress take precedence over all systems, except where the Building Code provides for means of protection to penetrations of these systems using protective closures and devices.

4. RESPONSIBILITY FOR SYSTEM PERFORMANCE IN COMPLETED WORK

- 4.1. The requirements for system performance that are to be achieved in the Work form an integral part of the Contract. Unless explicitly stated otherwise in writing in the Contract Documents, the responsibility for ensuring the performance of building systems in accordance with their general design intent, referenced prescriptive and performance requirements, and interrelated function shall be the responsibility of the Contractor. The Contractor may not, without the express written consent of the Owner, further assign this responsibility to any subcontractor or trade contractor.
- 4.2. The Contractor shall provide a warranty in accordance with the General Conditions for each specifically identified Building System in the Work, for a minimum of one year following date of Substantial Completion and for such longer periods as identified in the Contract Documents. Where responsibility for ensuring performance has been assigned in the Contract Documents to a specific Subcontractor, then both the Subcontractor and the Contractor shall provide such warranty. The Contractor is cautioned that a building system does not fall under the definition of "Product" under the Contract, as it includes both supply and installation.

5. CONTRACTOR'S AND TRADE CONTRACTOR'S REPRESENTATIVES

- 5.1. Commissioning Co-ordinator (See Section 018010 for description of duties and work required)
1. The Contractor shall appoint a Commissioning Co-ordinator. This individual shall be a trained, knowledgeable and responsible individual who is under the direct employ of the Contractor, and who shall be dedicated to this Contract at all times necessary for the duties entailed.
 2. The individual shall be acceptable to the Owner and Consultant.
 3. The Commissioning Co-ordinator shall not be changed during the course of the Work without acceptance of this change by the Consultant.
- 5.2. Building System Commissioners (See Section 018010 for description of duties and work required)
1. The Contractor and applicable Trade Contractors shall nominate a System Commissioner for each of the Building System in the Work, and in accordance with the List of Building Systems appended to this specification section.

2. System Commissioners shall be subject to review and acceptance by Owner and Consultant. The System Commissioner for a specific system shall not be changed during the course of the Work without acceptance of this change by the Consultant.
3. System Commissioners shall possess the knowledge and skills necessary to inspect and commission the applicable building system. Submit details of qualifications upon request. Specific systems specifications require trade contractor nomination of the individual.
4. The System Commissioner, together with the Contractor, shall perform all related services described in Division 01 to ensure the co-ordination, quality control, conformance with Contract, commissioning, and performance of requirements for the building system.

6. REVIEW OF BUILDING SYSTEMS DESIGN

- 6.1. Prior to commencement of the Work, The Contractor's Project Manager, Superintendent, Commissioning Co-ordinator, and all Building Systems Commissioners (hereinafter the Contractor's Review Team) shall conduct a complete review of the requirements of the Contract Documents so as to fully familiarize themselves with the requirements for the provision of each building system under the Contract.
 1. This review must include an understanding of the intent of each building system, the function of each system component, and any portions of the Work that may impact the performance of any of the completed systems.
 2. The Owner and Consultant will assist this review through participation at Building Systems Workshops, but the responsibility for achieving the review and complete understanding of the requirements of the systems and Contract rests solely with the Contractor and its Review Team.
 3. The Contractor's Review Team shall submit their certification of review of the Documents.
- 6.2. The Contractor shall employ personnel fully capable of conducting the above-noted review, and fully qualified through experience to co-ordinate the provision of the completed building system. The Contractor shall design all means, methods, techniques, sequences and procedures and co-ordinate the various parts of the Work to ensure that building systems are provided in accordance with Contract Requirements.
- 6.3. The Contractor's Review Team shall review all building systems for their relation to construction tolerances and movements in the building assemblies, including movements reasonably anticipated in the service life of the Project, and shall ensure that building systems accommodate such tolerances and movements without damage, distortion, breakage, or other failure.
- 6.4. The Contractor shall bring to the immediate attention of the Consultant any requirement of the Contract, or lack thereof, that in the opinion of the Contractor compromises the intent or potential performance of a building system.
- 6.5. Commencement of the installation of any part of a building system shall be deemed to mean that the Contractor has completed the review and is fully satisfied that the system performance required by the design intent and the Contract Documents is achievable using the Contractor's proposed construction means, sequences, trades, and methods.

7. IDENTIFICATION OF BUILDING SYSTEMS FOR THIS CONTRACT

- 7.1. For a complete list of Building Systems, and assignment of responsibility for the systems to Contractor and Trade Contractors, refer to the List of Building Systems Schedule, appended to the end of this Division, and bound within the specifications.

019521 EMERGENCY EGRESS SYSTEM

1. GENERAL

- 1.1. The following related systems and components of the Emergency Egress System are described elsewhere:
 1. Fire Separation System see Architectural Docs.
 2. Barrier Free Path of Travel System see Architectural Docs.
 3. Emergency Lighting System see Electrical Docs.
 4. Interior Lighting System see Electrical Docs.
- 1.2. The following related systems and components of related systems provide inputs to and receive outputs from the Emergency Egress System. They are described elsewhere as noted:
 1. Outdoor areas of assembly, as required by Building Code As existing, by Owner
 2. Firefighter access, as required by Building Code As existing, by Owner
- 1.3. The Emergency Egress System indirectly affects systems described elsewhere.
- 1.4. The intent of the Emergency Egress Systems is to ensure the safe evacuation of building occupants, from the building, through pathways of travel through building exits, to an exterior open space protected from fire exposure from the building. Systems may require installation of new products and assemblies, work to existing assemblies and materials, or a combination of existing and new construction. The new Egress System shall be commissioned prior to handover of the addition for Owner's use.
- 1.5. This Contract requires minor removals, additions, and alteration work to components of the existing Emergency Egress System that are accomplished by items of work described elsewhere in the Contract Documents, to accommodate other Work as set out on the drawings, as scheduled, and as specified in this Section.
- 1.6. In general, the Emergency Egress System includes, but is not limited to, the following components:
 1. devices for identifying and providing wayfinding to appropriate egress pathways and to the exterior of the building, including emergency lighting and emergency exit signage.
 2. pathways of travel of clear width and character to meet applicable codes and regulations, including but not limited to building code defined pathways such as *access to exit, public corridor, corridor providing access to the public, refuge areas and exits*.
 3. protection to maintain the quality of the pathways during an emergency situation so that all occupants have time for egress using the system, such as Fire Separations and fire extinguishers.
 4. accessories and appurtenances to regulate, monitor, maintain, and supervise the system and protect risk to occupants, including but not limited to doors and other secondary elements of the system and its subsystems; and
 5. external connection of components of the system to other systems, such as exterior refuge, and lighting systems, and devices for alerting occupants to an emergency situation
- 1.7. The routing of the pathway components of this building system and the requirements of this system shall take the precedence of all other building systems, where interference with proposed routing or other systems is encountered in the Work or in relation to existing conditions. Accommodate components of this system in laying out new or relocated portions of other systems.

- 1.8. The location of components of this system, and of other systems upon which the functioning of this system depends, shall be confirmed so that such devices can perform their role as components the Emergency Egress System. Other system components shall be installed to ensure a clear relation between devices of this system and the egress paths and spaces they serve. Where interference of components cannot be avoided by relocation of the component, provide a further component. Where such interference is brought to the Consultant's attention prior to installation of the interfering component or device, the Consultant will instruct regarding relocations or request additional work at Owner's expense. Where such interference is not brought to the Consultant's attention prior to installation of the interfering component, the Contractor shall provide relocation and /or additional component at no expense to the Owner.
- 1.9. The location of components of this system and other systems upon which it depends shall be confirmed by the Contractor with authorities having jurisdiction prior to installation.
- 1.10. The Contractor shall evaluate the classification of this facility and portions of the facility using the Ontario Building Code (OBC) matrix located on the architectural drawings, and shall inspect the OBC and applicable codes and regulations to ensure that the egress system design required by the Work is understood.
- 1.11. *Exits, access to exits, public corridors, means of egress, impeded egress zone, aisles, guards, and suites* are hereby defined in accordance with the definition of such terms in the Ontario Building Code, as if repeated here.
- 1.12. Schedule during initial phases of project start-up a meeting with the Consultant to review and consider the means and methods proposed by the Contractor for installation of the systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and Trade Contractors who will perform the work related to this system.
- 1.13. Plan and sequence work to permit installation of materials in conjunction with related materials so that the performance intent of the systems is achieved.
- 1.14. Submit as described in 013030, acknowledgement to Consultant's satisfaction of review of submittals of other systems as they relate to this system.
- 1.15. Co-ordination and Quality Control
 1. The Contractor's site superintendent shall be the System Commissioner for this System, and shall review submittals of this and other work to ensure full understanding of the interrelation of components that will achieve the performance of the Emergency Egress Systems.
 2. Inspection work and co-ordination work required to achieve the requirements of this Section are the responsibility of the Contractor's site superintendent and shall not be assigned to a trade contractor even if portions of the material installation work are so assigned.
- 1.16. Reference Standards and Codes
 1. Ontario Building Code requirements for continuous and complete emergency egress pathways, means of egress, and exits shall be achieved throughout the building, both existing and new.
- 1.17. Requirements For Temporary Facilities, Safety And Environment
 1. Conform and cooperate to ensure requirements for temporary facilities, safety, cleaning and waste management, and environment are achieved throughout the course of the Work. Provide an appropriate Emergency Egress System for the personnel performing work of this Contract, including Confined Space designs, scaffolding designs, and other designs where required to ensure the safety of such personnel.

1.18. Commissioning Requirements

1. Perform commissioning requirements in accordance with Division 1 requirements to ensure the proper function of components of the system, and the system. Commission the system to verify the proper performance of all system components, and the system. Perform commissioning prior to handover to Owner's for use.

1.19. Identification of Building Systems

1. In addition to the Emergency Egress System, the work described by this Section is related to the other Building Systems as defined in Section 019010 and discussed elsewhere in this Section. Comply with requirements for performance, review, and co-ordination of such relations as set out in that Section.

2. PRODUCTS AND EXECUTION

- 2.1. Supply and installation of components of the emergency egress system are described in related sections and divisions of the specification, in schedules, and on drawings. In general, the system is accomplished by the proper co-ordination of work to other systems required by the Work.

2.2. General

1. Execute work as described herein and as necessary to achieve performance.
2. Co-ordinate work described elsewhere in the Contract to ensure complete and continuous systems to achieve Ontario Building Code objectives for egress and occupant safety.
3. Provide appropriate temporary signage, emergency lighting, and exit signage to maintain Egress System during all phases.

2.3. Examination

1. Examine work to other building systems to ensure conditions are satisfactory to achieve the performance standards for the design intent of this system.
2. Schedule installation of components and other systems in strict accordance with sequencing requirements to achieve performance.
3. Requirements for installation of products that form components of the Emergency Egress Systems are described in related specification, in schedules, and on drawings.

019522 FIRE SEPARATION SYSTEM

1. GENERAL

1.1. The following components of the Fire Separation System are additionally described elsewhere:

- | | |
|--|-----------------|
| 1. Fire Protection components of Environmental Separation System | see Arch. Docs. |
| 2. Fire-stopping | see Arch. Docs. |
| 3. Fire Protection Components of Plumbing | see Mech. Docs. |
| 4. Fire Protection Components of Air Distribution System | see Mech. Docs. |

1.2. The following related systems and components of related systems provide inputs to and receive outputs from the Fire Separation System. They are described elsewhere as noted:

- | | |
|--|--------------------|
| 1. Emergency Egress System, receiving protection to pathways | |
| 2. Components of Assemblies, providing input to this system | as described above |
| 3. Building Structural System, receiving fire protection | Section 01951 |
| 4. Mechanical and Electrical Systems, component protection | see Mech. & Elec. |

1.3. The Fire Separation System may indirectly affect systems described elsewhere.

1.4. The intent of the Fire Separation System is to achieve continuous and effective separation, containment, and resistance to the spread of fire and smoke or the effects of fire and smoke in the building and beyond, through the installation of ULC-tested and OBC-approved assemblies that are specific to the location and materials used to achieve this performance. Systems may require installation of new products and assemblies, work to existing assemblies and materials, or a combination of existing and new construction.

1. The system is existing throughout the existing building and to the complete surround of all tenant suites, and shall be altered by the Work of this Contract; and
2. The system is new, to select locations and areas within the bounds of the fit-up areas.

1.5. This Contract requires removals, additions, and alteration work to components of the existing Fire Separation System that are accomplished by items of work described elsewhere in the Contract Documents, to accommodate other Work as set out on the drawings, as scheduled, and as specified in this Section.

1.6. In general, the Fire Separation System includes, but is not limited to, assemblies of installed Products and materials that consist of the following components:

1. Surface materials and fire-resistive membranes barrier materials to resist the spread of fire, smoke, and gases
2. Support elements and connections to building structure to hold resistive membranes in place during fire events, including against expansion, pressure, and other forces simulated in fire-resistance tests
3. Connections of membranes and firestopping at perimeters of the system
4. Closures to protect weaknesses and openings in the assemblies
5. Firestopping and devices to protect penetrations in the assemblies of the system
6. Controls to effect shutdowns and procedures upon event.

1.7. The routing of the pathway components of this building system and the requirements of this system shall take the precedence of all other building systems in accordance with ULC assembly tests and certifications of installation requirements, where interference with proposed routing or other systems is encountered in the Work or in relation to existing conditions. Accommodate components of this system in laying out new or relocated portions of other systems.

- 1.8. The location of components of this system, and of other systems upon which the functioning of this system depends, shall be confirmed so that the components can perform their role in the Fire Separation System. Other system components shall be installed to ensure a clear relation between those components and the functions they serve as components of this system. Where interference of components cannot be avoided by relocation or sequencing, provide a further component. Where such interference is brought to the Consultant's attention prior to installation of the interfering component or device, the Consultant will instruct regarding relocations or request additional work at Owner's expense. Where such interference is not brought to the Consultant's attention prior to installation of the interfering component, the Contractor shall provide relocation and /or additional components at no expense to the Owner.
- 1.9. The location of components of this system shall be confirmed by the Contractor with authorities having jurisdiction prior to installation.
- 1.10. The Contractor shall evaluate the classification of this facility and portions of the facility using the Ontario Building Code (OBC) matrix located on the architectural drawings, and shall inspect the OBC and applicable codes and regulations to ensure that the fire separation system design is understood.
- 1.11. Definitions
 1. Note that a fire separation may have a fire-resistance rating or not (so-called *smoke separation*). Ratings of separations are in accordance with accepted ULC test assemblies and other methods as set out in the Ontario Building Code.
 2. *Firewall, fire separation, opening, closure, and fire-resistance rating* are hereby defined in accordance with the definition of such terms in the Ontario Building Code, as if repeated here.
 3. For the purposes of this Contract, hoarding and temporary partitions separating the construction areas from other areas of the existing building are considered part of the Fire Separation System, as components or subsystems.
- 1.12. Pre-Installation Conference
 1. Schedule during initial phases of project start-up a meeting with the Consultant to review and consider the means and methods proposed by the Contractor for installation of the systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and Trade Contractors who will perform the work related to this system.
- 1.13. Sequencing
 1. Plan and sequence work to permit installation of materials in conjunction with related materials so that the performance intent of the systems is achieved. Trades shall strictly conform to sequencing requirements for Fire Separation Systems. Such requirements shall have primary precedence over all other construction sequences.
- 1.14. Submittals
 1. Acknowledgement to Consultant's satisfaction of review of submittals of other systems and components as they relate to this system.
 2. Prior to ordering materials submit evidence of conformance of materials to ULC requirements for system components.
- 1.15. Co-ordination and Quality Control
 1. The Contractor's construction superintendent shall review submittals of this and other work to ensure full understanding of the interrelation of components that will achieve the performance of the Fire Separation Systems.

2. Inspection work and co-ordination work required to achieve the requirements of this Section are the responsibility of the Contractor's site superintendent and shall not be assigned to a trade contractor even if portions of the material installation work are so assigned.

1.16. Reference Standards and Codes

1. Ontario Building Code requirements for continuous and complete fire separation assemblies, firewall assemblies, and fire-resistance ratings shall be achieved to all locations noted for such assemblies.
2. All assemblies shall be constructed to conform to a ULC test certification or other certification such as CSA, UL, NFPA, or FM as accepted under the Ontario Building Code and by authorities having jurisdiction.

1.17. Requirements For Temporary Facilities, Safety and Environment

1. Conform and cooperate to ensure requirements for temporary facilities, safety, cleaning and waste management, and environment are achieved throughout the course of the Work. Provide an appropriate Fire Separation System for the personnel performing work of this Contract, where required to ensure the safety of such personnel.
2. Protect the existing building by installing hoarding and partitions as fire separations.
3. Ensure existing systems of fire separation are maintained and protected from effects of the Work, so that the existing facility has a continuously functioning Fire Separation System. Design and provide alternative components to the system where required by the organisation of the ways and means for performing the Work. Minimise such disruptions wherever possible in the planning of the Work.

1.18. Commissioning Requirements

1. Perform commissioning requirements in according with Division 1 requirements to ensure the proper function of components of the system, and the system.

1.19. Identification of Building Systems

1. In addition to the Fire Separation System, the work described by this Section is related to the other Building Systems as defined in Section 019010 and discussed elsewhere in this Section. Comply with requirements for performance, review, and co-ordination of such relations as set out in that Section.

2. PRODUCTS AND EXECUTION

- 2.1. Products and execution for components of fire separation systems are described in related sections and divisions of the specification, in schedules, and on drawings.

2.2. Examination

1. Examine supports, substrates and work to other building systems to ensure conditions are satisfactory to achieve the performance standards for the System.
2. Commencement of the work shall imply acceptance of conditions.
3. Schedule installation of components in strict accordance with sequencing requirements to achieve ratings and performance.

- 2.3. Execute work as described herein and to achieve system performance.

- 2.4. Co-ordinate work described elsewhere in the Contract to ensure complete and continuous systems to achieve Ontario Building Code objectives for fire protection and occupant safety.
- 2.5. Install products to form components of assemblies to conform with ULC approved test assemblies.
- 2.6. Provide work to perimeter of assemblies and penetrations of assemblies to conform to OBC requirements and ULC approved tests for firestopping and closures to openings in assemblies.
- 2.7. Provide work to existing party walls to maintain integrity of existing ratings.
- 2.8. Fire Separation Assemblies may be required at the following locations and where indicated on the drawings:
 1. to surround OBC-defined exit facilities;
 2. to surround OBC-defined Public Corridors (not applicable on this project);
 3. to surround and isolate service shafts and service spaces including ceilings, from other spaces; and
 4. to control combustibility and smoke generation of materials in case of fire.
- 2.9. Perimeter and Penetrations of Assemblies
 1. Ensure perimeter of assemblies and penetrations through the fire separation assemblies are protected in accordance with performance requirements, ULC tested assembly requirements, as described in related Sections, and as indicated on drawings.
 2. Firestopping, fire dampers, protection collars to combustible piping, and other protections as required by Code shall be installed in a timely fashion, and so that they may be inspected by authorities and maintained by the Owner.
 3. Ensure sizes of openings without protection conform to Code restrictions.
 4. Ensure penetrations of wiring and small piping are bundled within neat sleeves to facilitate proper allowance for movement and firestopping.
- 2.10. Protection of Openings
 1. Ensure openings in assemblies are protected using closures installed in accordance with NFPA and ULC tests or otherwise as prescribed by the governing building and fire codes.

019530 BARRIER FREE PATH OF TRAVEL SYSTEM

1. GENERAL

- 1.1. The Contractor shall thoroughly review all Sections of the specifications, and all drawings, to ensure that the requirements for execution of complete and functioning Barrier-free Path of Travel Systems throughout the Work.
- 1.2. Assignment of Responsibility
 1. The Contractor's Site Superintendent shall be the System Commissioner for the System, and shall review submittals of this and other portions of the Work to ensure the provision and interrelation of components that will achieve the performance of the Barrier-Free Path of Travel Systems.
 2. Inspection and co-ordination work required to achieve the requirements of this Section are the responsibility of the Contractor's Superintendent and shall not be assigned to a trade contractor even if portions of the material installation work are so assigned.
- 1.3. In general, barrier-free path of travel systems consist of the following components:
 1. Sloped floors, ramps and handrails, elevators and lifts, and other assistive devices of appropriate size and configuration necessary to achieve transitions between levels within or outside the Facility in compliance with
 2. specific points of transition among different surfaces and levels (for instance curb cuts in sidewalks) and detection devices such as tactile strips and deliberate colour contrast at transitions from floor to wall or area to area
 3. specific considerations for clearances at doors and openings, together with operational hardware suitable for accessibility
 4. Appropriate light and auditory levels that maximize perception of the environment
 5. accessible washroom, shower, and similar facilities for users of Barrier-free areas, with assistive devices and consideration for location of accessories and aids
 6. Parking spaces, drop-off areas, and pathways of appropriate width, gradient and surface finish, with appropriate signage and markings
 7. Characteristics for surface finishes in the Interior Finish System including slip-resistance, colour and contrast.
 8. Appropriate height and configuration of switches, counters, millwork, and other similar device, finish and equipment elements to ensure accessible use
- 1.4. The barrier-free path of travel system is existing throughout the building, and requires modification and installation of new products and components to alter existing components of the system. Where systems are located in portions of the Facility that are not otherwise affected by the Work, existing barrier-free paths of travel shall remain without alteration, and shall be maintained for all occupied portions of the Facility throughout the Contract Time.
- 1.5. The system is existing to all areas of the 2nd Floor fit-up space, for alteration by the Contract. Extend the existing system, and construct to meet new standards and the requirements of this Contract. No existing condition in the Facility shall reduce or alleviate a contract requirement for the work to provide all new portions of the Barrier-Free Path of Travel System.

1.6. Definitions

1. *Barrier-free* is hereby defined in accordance with the definition of such terms in the Ontario Building Code (OBC) and the Ontarians with Disabilities Act (AODA), as if repeated here.
2. *Accessible* is hereby defined as being in accordance with the City of Waterloo Built Environment Standard.

1.7. The intent of the Barrier-free Path of Travel Systems is to ensure that the building and its facilities, either in whole or in part are accessible to persons with the widest range of physical or sensory abilities. The Barrier-free Path of Travel System includes, either singly or in combination:

1. Clear Widths
2. Mounting Heights
3. Ease of Use
4. Colour and Surface Contrasts
5. Dedicated Equipment or Assistive Devices

1.8. Clear Widths and Mounting Heights:

1. Construct work of this contract with due regard for finished clear widths and mounting heights of items and elements so that users may pass with clearances and reach items as set out in the OBC Barrier Free regulations. Do not proceed in uncertainty.

1.9. Ease of Use

1. The Work shall be performed so that installation of elements of the Work results in greatest ease of use, regardless of ability. Do not proceed in uncertainty.

1.10. Pre-Installation System Workshop

1. Schedule during initial phases of project start-up the Contractor shall convene a workshop session with the Consultant to review and consider the design and its intent, and the means and methods proposed by the Contractor for installation of the systems.
2. The Contractor shall ensure that the location, intent, and requirements of the systems are clearly understood by the Superintendent, and all Trade Contractors who will perform aspects of the Work related to this System.

1.11. Sequencing

1. Plan and sequence work to permit installation of materials in conjunction with related materials so that the performance intent of the systems is achieved. Trades shall strictly conform to sequencing requirements for the Barrier-Free Path of Travel System. Such requirements shall have primary precedence over all other construction sequences.
2. Provide Barrier-free Path of Travel Systems through all construction phases and maintain the system for all occupied portions of the Facility throughout the Contract Time. Pay for changes required to accomplish the systems at each stage of occupancy and the Work.

1.12. Submittals

1. Prior to ordering materials submit evidence of conformance of materials to OBC requirements for system components in Barrier-Free Paths of Travel.

1.13. Reference Standards and Codes

1. Ontario Building Code requirements for continuous and complete Barrier-free Path of Travel shall be achieved to all locations noted for such assemblies within areas of the Facility affected by the Work.
2. Compliance with the Accessibility for Ontarians with Disabilities Act (AODA) forms the basis of the minimum performance requirement for this System.

1.14. Commissioning and Performance Verification Requirements

1. Perform commissioning requirements in according with Division 01 and Section 018010 requirements to verify the proper performance of components of the system, and the system. Acceptance of system shall be to satisfaction of Owner, Consultant, and OBC Building Official.

1.15. Building Systems Requirements

1. The work described by this Section is related to other Building Systems as defined in Section 019010. Comply with requirements for performance, review and co-ordination of such relations.

2. PRODUCTS & EXECUTION

- 2.1. Co-ordinate work described elsewhere in the Contract to ensure a complete and continuous Barrier-free system to areas affected by the Work to achieve Ontario Building Code requirements and AODA objectives for accessibility.
- 2.2. Commencement of the work shall imply acceptance of conditions. Examine existing conditions carefully. Do not proceed in uncertainty.
- 2.3. Install Products that form components of the Barrier-Free Path of Travel Systems as described in related sections and divisions of the specification, in schedules, and on drawings, including limited:
 1. doors, frames, and hardware, for clearances and assistive operation functions,
 2. interior finishes work, including clearances and related surface characteristics
 3. interior lighting and emergency lighting and control, for necessary light levels
 4. devices of other Systems, for accessible mounting heights
 5. clearance within floor areas for aisles and code-mandated clear widths within occupied areas
 6. site finishes and signage
 7. construction of assistive elements for changes in level, including associated handrails and curbs
 8. accessible sanitary devices and equipment and millwork components related to occupant use of the Facility.
- 2.4. Install components to meet requirements of the systems and construction of which they form part, and additionally to produce the required performance for the Barrier-Free Path of Travel System.

019550 BUILDING STRUCTURAL SYSTEM

1. GENERAL

- 1.1. The following components of the Building Structural System are additionally described elsewhere:
 1. Contributions to structure by concrete
 2. Contributions to structure by structural steel
 3. Contributions to structure by wood framing
- 1.2. The Building Structural System provides physical support to all other components building systems, as set out herein. In certain instances building system components may be physically supported by other building systems or components, which in turn are supported by the structural building system. In general, all conduits, pipes, ducts, equipment, and accessories and devices weighing in excess of 20 kg. must be supported directly from the building structural system unless specifically permitted in the specification.
- 1.3. Certain components of systems must be supported directly from the structural system by code, regulation, manufacturer's recommendation, or authority having jurisdiction. The Contractor shall ensure that such support is provided.
- 1.4. The Building Structural System indirectly affects the following systems described elsewhere:
 1. Interior finishes
 2. Emergency Egress System
 3. Exterior Envelope System
- 1.5. The intent of the Building Structural System is to permanently, safely, and effectively anticipate and receive the transfer of all dead and live loads and forces from other building systems and from the structural system itself. Such loads and forces are then transferred to founding soil. The system shall have sufficient structural capacity and structural integrity at all points within the system components to resist the received loads, the effects of the loads and influences that may reasonably be expected, having regard to the expected service life of the building. The system is existing, and is being reinforced as specified on the drawings.
- 1.6. The Building Structural System shall support the comfort and activity of the building occupants and their activities as may be anticipated, with due regard for the effects of movement, sway, vibration, and other effects that affect serviceability and occupant comfort.
- 1.7. The system is designed with anticipated expansion, contraction, deflection, movement, vibration and deformation under dead and live loads within tolerances, and shall be constructed with due regard for such tolerances. All connections of the system to other systems and construction, and connection of system components themselves, shall be designed for such movement, so that no unintended loads are transferred when forces that may reasonably be anticipated are imposed.
- 1.8. The system allows for similar tolerances and movements of components of other systems, and connections of those other systems to the Building Structural System shall be constructed with due regard for such tolerances and movement, caused by forces that may reasonably be anticipated.
- 1.9. The existing Building's Structural System shall remain a complete and functional system with minimum interruption, and where interrupted safely braced and shored in accordance with codes and regulations, while the work of this Contract is performed.
- 1.10. This Contract requires removals, additions, and alteration work to components of the existing Building Structural System that are accomplished by items of work described elsewhere in the Contract Documents, to accommodate other Work as set out on the drawings, as scheduled, and as specified in this Section.

- 1.11. It is extremely important that construction activities do not impose loads on the system or any component that are not anticipated by the design of the system. The structural system is designed for the use and occupancy of the finished Work, not for loads caused howsoever by construction, or temporary loads that may be imposed on components during alteration of the existing structural system.
- 1.12. In general, the Building Structural System includes, but is not limited to, assemblies of installed Products and materials that consist of the following components:
1. membrane components such as horizontal and vertical surfaces that gather live loads imposed by environmental forces, use and occupancy (such as slabs, decks, wall cladding, or similar), and dead loads. Such components may be part of other building systems, such as the environmental separation system, or provide direct membrane support to such systems.
 2. conductive resisting members that receive the loads imposed by such membranes at bearing points, organise and resolve the forces and effects created by the loads, and in turn pass the loads and effects to members designed to receive them and to the building foundation subsystem;
 3. a building foundation that receives the loads and the effects of the loads, and resolves and passes the loads safely and effectively to the supporting soil or rock, taking into consideration the characteristics of the ground into which the forces are transmitted and the environment of the site;
 4. connecting components between members & from the system to components of other systems;
 5. component devices to dampen or reduce the effects of loads, and
 6. connections to other systems to receive the dead and live loads of such systems.
- 1.13. The routing of the pathway components of this building system and the requirements of this system shall take the precedence of all other building systems unless measures are specifically anticipated in the structural design to accommodate the passage of another system. Where interference with proposed routing or other systems is encountered in the Work or in relation to existing conditions, accommodate the requirements of components of this system in laying out new or relocated portions of other systems.
- 1.14. The location of components of this system, and of other systems upon which the functioning of this system depends, shall be confirmed so that the components can perform their role in the Building Structural System. Other system components shall be installed to ensure a clear relation between those components and the functions they serve as components of this system. Where interference of components cannot be avoided by relocation or sequencing, provide a further component. Where such interference is brought to the Consultant's attention prior to installation of the interfering component or device, the Consultant will instruct regarding relocations or request additional work at Owner's expense. Where such interference is not brought to the Consultant's attention prior to installation of the interfering component, the Contractor shall provide relocation and/or additional components at no expense to the Owner.
- 1.15. The Contractor shall evaluate the classification of this facility and portions of the facility using the Ontario Building Code (OBC) matrix located on the architectural drawings, and shall inspect the OBC and applicable codes and regulations to ensure that the OBC-mandated loads and forces to which the Building Structural System design must respond are clearly understood. The Contractor shall review the existing building to gain a general understanding of the existing building structural system. In no case shall the Contractor proceed in uncertainty. Contact the Consultant wherever clarification is required.

1.16. Definitions

1. Definitions of live & dead loads, effects of loads, and other structural terms, shall be as set out in the Building Code and consistent with established engineering principles.
2. For the purposes of this Contract, and only for the purposes of allowing the support of minor devices of building systems with flexible connections, non-loadbearing partitions may be considered as part of the building structural system, where constructed to receive the loads of such devices as allowed and set out in the Building Code.

1.17. Pre-Installation Conference

1. Schedule during initial phases of project start-up a meeting with the Consultant to review and consider the means and methods proposed by the Contractor for installation of the systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and Trade Contractors who will perform the work related to this system.

1.18. Sequencing

1. Plan and sequence work to permit installation of materials in conjunction with related materials so that the performance intent of the systems is achieved. Trades shall strictly conform to sequencing requirements for the Building Structural System. Such requirements shall have primary precedence over all other construction sequences.

1.19. Submit as described in Division 1:

1. Acknowledgement to Consultant's satisfaction of review of submittals of other systems as they relate to this system.
2. Prior to ordering materials submit evidence of conformance of materials to meet capacity requirements for system components, by Shop Drawing or other Submittal as requested by the Consultant or in material specification sections.

1.20. Co-ordination and Quality Control

1. The Contractor's construction superintendent shall review submittals of this and other work to ensure full understanding of the interrelation of components that will achieve the performance of the Building Structural System.
2. Inspection work and co-ordination work required to achieve the requirements of this Section are the responsibility of the Contractor's site superintendent and shall not be assigned to a trade contractor even if portions of the material installation work are so assigned.
3. Review by the Consultant and inspection by the Owner's inspection forces are for the Owner's quality control purposes, and do not relieve the Contractor of requirements for quality control.

1.21. Reference Standards and Codes

1. Ontario Building Code references and standards, and the references and standards set out in individual component specifications shall apply to the Building Structural System. Comply with such standards.

1.22. Requirements For Temporary Facilities, Safety and Environment

1. Conform and cooperate to ensure requirements for temporary facilities, safety, cleaning and waste management, and environment are achieved throughout the course of the Work. Provide an appropriate structural system for the personnel performing work of this Contract, where required to ensure the safety of such personnel.

2. Ensure existing portions of the structural system are maintained and protected from effects of the Work. Design and provide alternative components to the system where required by the organisation of the ways and means for performing the Work. Minimise such disruptions wherever possible in the planning of the Work.

1.23. Commissioning Requirements

1. Perform commissioning requirements in accordance with Division 1 requirements to ensure the proper function of components of the system.

1.24. Identification of Building Systems

1. In addition to the Building Structural System, the work described by this Section is related to the other Building Systems as defined in Section 019010 and discussed elsewhere in this Section. Comply with requirements for performance, review, and co-ordination of such relations as set out in that Section.

2. PRODUCTS AND EXECUTION

- 2.1. Products and execution for components of Building Structural System are described in related sections and divisions of the specification, in schedules, and on drawings.

2.2. Examination

1. Examine supports, substrates and work to other building systems to ensure conditions are satisfactory to achieve the performance standards for the work of this Section.
2. Commencement of the work shall imply acceptance of conditions.
3. Schedule installation of components in strict accordance with sequencing requirements to achieve installation and performance.

2.3. Execute work as described herein and to achieve performance.

- 2.4. Co-ordinate work described elsewhere in the Contract to ensure complete and continuous systems to achieve Ontario Building Code objectives for the building structural system.

- 2.5. Install products to form components of the structural system to conform with requirements of reference standards and to permit movement only within tolerances allowed in the design. Install products and materials so that forces are transmitted as intended by the design, in all conditions of service in the life of the building.

- 2.6. The Work requires that due attention be paid to existing building informal expansion joints. The building structure has several alterations of original structure that may be subject to movement or degradation. Provide for movement that may be anticipated in the existing structural system. Report all degradation to the Consultant.

- 2.7. Ensure fasteners and connections to adjacent portions of the existing building and work are designed to transmit forces as intended, and within tolerances. Where movement of a system or component is required, such as expansion joints, design connections to properly transmit forces without compromising movement.

END OF DIVISION

Contractor's Letterhead

Submittal Transmittal

| | |
|--|----------------------|
| City Hall 2 nd Floor Renovation | Project |
| City of Waterloo | Owner |
| _____ | Contractor |
| _____ | Title of Submittal |
| _____ | Submission sched ref |
| _____ | Date initiated |
| _____ | Spec section |
| _____ | Building System(s) |

We, _____, hereby enclose the following portion of the Work which is required by the Contract Documents. We understand and agree that in submitting we are acknowledging that this Submittal is complete and meets all Contract Requirements outlined in the Specifications. We have examined this Submittal, verified field measurements unless otherwise noted, and certify compliance with the Contract. We have examined General Condition 3.10 as amended by the Supplementary Conditions and Division 1 of the specification, and understand that GC 2.4.3 may apply to this Submittal.

**THE ORIGINAL OF THIS FORM REMAINS WITH THE ORIGINAL SUBMITTAL AT ALL TIMES.
RETAIN A COPY FOR YOUR RECORDS.**

CONTRACTOR COMPLETES THE FOLLOWING:

| | | | | |
|------------------------|-------|------------------------|-------|--------------|
| Submittal is: | _____ | First Submission | _____ | Resubmission |
| | _____ | Interference Dwg. | _____ | Shop Drawing |
| | _____ | Product Description | _____ | Sample |
| Submittal Consists of: | _____ | 1 interactive PDF file | _____ | Other |

If Submittal requires professional design, proof of the professional's liability insurance is enclosed.

[Contractor's name and signature] _____ Date: _____

CONSULTANT TEAM AND OWNER COMPLETE ONGOING RECORD OF TRANSMITTAL

| From: | To: | Copies | Comment | Date Sent | Date Rec'd |
|------------|------------|--------|---------|-----------|------------|
| Supplier | Contractor | | | | |
| Contractor | JMA | | | | |
| JMA | Owner | | | | |
| JMA | Consultant | | | | |
| Owner | JMA | | | | |
| Consultant | JMA | | | | |
| JMA | Contractor | | | | |

| RECORD OF REVIEW | 1 REVIEWED | 2 REVIEWED AS NOTED | 3 REVISE AND RESUBMIT | 4 NOT REVIEWED |
|------------------------------|------------|---------------------|-----------------------|----------------|
| Supplier/Trade Contractor | | | | |
| Bldg. System Commissioner | | | | |
| Bldg. System Co-ordinator | | | | |
| Contractor's Project Manager | | | | |
| Owner | | | | |
| SubConsultant | | | | |
| JMA | | | | |

Trade LETTERHEAD

Warranty

City Hall 2nd Floor Renovation
City of Waterloo

*project
owner
general contractor
spec section reference
building systems affected*

We, *[insert full name of trade]*, hereby warrant the following portion of the Work in accordance with GC 12.3.1 and 4 of the General Conditions of the Contract between the Owner *[insert full name of Owner]* and General Contractor *[insert full name of General Contractor]* for the Contract noted above. We shall correct promptly upon receiving notice from the Owner, and without expense to the Owner, defects or deficiencies in the Work which appear prior to and during the Warranty Period noted herein. We shall promptly correct or pay for damage resulting from corrections made under the requirements of this Warranty.

Portion of the Work covered by this Warranty is:

[refer to technical sections or divisions of the specifications where warranty is for an aspect of the Work. State clearly the description of work covered]

Warranty Period is: *[insert number of years]* years from the date of Substantial Performance of the Work, and expires on *[insert expiry date]*.

[Or, where portion of Work is accepted after the date of Substantial Performance of the Work]

Warranty Period is: *[insert number of years]* years from the date of acceptance of the portion of the Work, and expires on *[insert expiry date]*.

[Name and address of General Contractor]

[Name and address of Trade Contractor]

[signature]

I have authority to bind the Corporation

[signature]

I have authority to bind the Corporation

| No. | Building System | Req'd? (Y/N) | Exist/ New? | System Responsibility | | Spec. Section | Comments |
|-------|---|-----------------|----------------|-----------------------|------------------------|------------------|---|
| | | | | Design | Construction | | |
| 1.1 | Emergency Egress System | Y | Both | JMA | GC | 019521 | New & alter exist., to OBC |
| 1.2 | Fire Separation System | Y | Both | JMA | GC | 019522 | New & alter exist., to OBC |
| 1.3 | Barrier-free Path of Travel System | Y | Both | JMA | GC | 019530 | New & alter exist., to Standards |
| 1.4 | Reserved | | | | | | |
| 1.5 | Building Structural System | | | | | | |
| | 1. Structural System | Y | Exist. | - | - | - | No change, Protect Existing |
| | 2. Shoring System | N | - | - | - | - | not applicable |
| | 3. Scaffolding System | N | - | - | - | - | not applicable |
| 2-6 | Reserved | | | | | | |
| 7.1 | Environmental Separation Systems | | | | | | |
| | 1. Roofing Systems | Y | Exist. | - | - | - | No change |
| | 2. Exterior Wall Enclosure Systems | Y | Exist. | - | GC | - | Protect exist. As may be req'd. |
| | 3. Overhanging Floor Enclosure Systems | N | - | - | - | - | not applicable |
| | 4. Curtainwall Systems | N | - | - | - | - | not applicable |
| | 5. EIFS (Exterior Insulation Finish System) | N | - | - | - | - | not applicable |
| 8.1 | Roll-up Door System | N | - | - | - | - | not applicable |
| 8.2 | Automatic Sliding Entrance Door System | N | - | - | - | - | not applicable |
| 9.1 | Interior Finish Systems | Y | Both | JMA | GC | Div. 09 | to all interior areas |
| 10 | Reserved | | | | | | |
| 11.1 | Storage Racking System | N | - | - | - | - | by Owner |
| 11.2 | Loading Dock system | N | - | - | - | - | not applicable |
| 11.3 | Parking / Entry Control System | N | - | - | - | - | not applicable |
| 11.4 | Scoreboard System | N | - | - | - | - | not applicable |
| 11.5 | Process Equipment Systems | N | - | - | - | - | not applicable |
| 11.6 | Waste Disposal System | N | - | - | - | - | not applicable |
| 12.1 | Window Shading System | Y | New | JMA / Owner | GC | Div. 12 | new window shades |
| 13.1 | Air-Supported Structure System | N | - | - | - | - | not applicable |
| 13.2 | Vibration Control System | N | - | - | - | - | local to equipment only |
| 13.3 | Sound Control System | N | - | - | - | - | local to assemblies only |
| 14.1 | Conveying Systems | | | | | | |
| | 1. Elevator System | Y | Exist. | - | GC | - | No change, Protect Existing |
| | 2. Escalator or Moving Walk System | N | - | - | - | - | not applicable |
| | 3. Pneumatic Tube System | N | - | - | - | - | not applicable |
| 15-19 | Reserved | | | | | | |
| 21.1 | Fire Suppression & Extinguishing System | | | | | | |
| | 1. Sprinkler System | Y | Alter | MAB/JMA | GC/Sprinkler Trade | see RCP's | Alter to suit fit-up |
| | 2. Standpipe System | N | - | - | - | - | not applicable, exist unchanged |
| | 3. Commercial Kitchen Suppression System | N | - | - | - | - | not applicable |
| | 4. Clean Agent Suppression System | N | - | - | - | - | not applicable |
| | 5. Dry Chemical Suppression System | N | - | - | - | - | not applicable |
| 22.1 | Plumbing Systems | | | | | | |
| | 1. Potable Water System | Y | Alter | M.A. Bryan | GC/Plumbing Trade | see Mech. | Removals |
| | 2. Non-Potable Water System | N | - | - | - | - | not applicable |
| | 3. Sanitary Sewage System | Y | Alter | M.A. Bryan | GC/Plumbing Trade | see Mech. | Removals and Replacements |
| | 4. Storm Drainage System | Y | Exist. | - | - | - | Protect exist. As may be req'd. |
| | 5. Gas Distribution System | Y | Exist. | - | - | - | Protect exist. As may be req'd. |
| | 6. Special Gases Systems | N | - | - | - | - | not applicable |
| | 7. Compressed Air System | N | - | - | - | - | not applicable |
| | 8. Vacuum System | N | - | - | - | - | not applicable |
| | 9. Swimming Pool Plumbing System | N | - | - | - | - | not applicable |
| 23 | The HVAC Systems | Y | Alter | M.A. Bryan | GC/HVAC Trade | see Mech. | Alter and New |
| 23.1 | Thermal Generation Systems | | | | | | |
| | 1. Heat Generation Systems (Hydronic) | N | - | - | - | - | not applicable |
| | 2. Refrigeration Generation Systems | N | - | - | - | - | not applicable |
| 23.2 | Heat Transfer System | | | | | | |
| | 1. Hydronic Heat Transfer System | Y | Alter | MAB/JMA | GC/HVAC Trade | Dwgs. | See Mech & Arch - Alterations |
| | 2. Chilled Water Transfer System | N | - | - | - | - | not applicable |
| | 3. Thermal Storage Systems | N | - | - | - | - | not applicable |
| 23.3 | Air Distribution Systems | | | | | | |
| | 1. Air Distribution Systems | Y | Alter | M.A. Bryan | GC/HVAC Trade | see Mech. | Existing and New |
| | 2. Humidification Subsystem | Y | Exist. | - | - | - | Central, to remain |
| | 3. Exhaust Systems | Y | New | M.A. Bryan | GC/HVAC Trade | see Mech. | Existing and New |
| | 4. Air Transfer Systems | Y | Alter | M.A. Bryan | GC/HVAC Trade | see Mech. | Existing and New |
| | 5. Special Systems | N | - | - | - | - | not applicable |
| | 6. Dust Collection System | N | - | - | - | - | not applicable |
| | 7. Spray Booth System | N | - | - | - | - | not applicable |
| 24 | Reserved | | | | | | |
| 25.1 | Building Monitoring System | Y | Alter | M.A. Bryan | GC/HVAC/Controls Trade | see Mech. | Controls to HVAC Systems by Owner nominated Trade |
| 26 | Electrical Systems | | | | | Div. 26 | Work to Standards of this Div. |
| 26.1 | Power Generation Systems | | | | | | |
| | 1. Emergency Electrical Generation System | N | - | - | - | - | |
| | 2. Back-up Generating System | Y | Exist. | - | - | - | No change |

| No. | Building System | Req'd? (Y/N) | Exist/ New? | System Responsibility | | Spec. Section | Comments |
|-------|---|-----------------|----------------|-----------------------|---------------------|------------------|---------------------------------|
| | | | | Design | Construction | | |
| | 3. Wind Energy Generation System | N | - | - | - | - | not applicable |
| | 4. Solar Energy Generation System | N | - | - | - | - | not applicable |
| 26.2 | Electrical Distribution System | | | | | | |
| | 1. High voltage (more than 35,000 V) | N | - | - | - | - | not applicable |
| | 2. Medium voltage (over 575 to 35,000V) | N | - | - | - | - | not applicable |
| | 3. Low voltage (575 V & under) | Y | Alter | Mighton | GC/Electrical Trade | see Elec. | Extend Existing and New |
| | 4. Grounding System | Y | Alter | Mighton | GC/Electrical Trade | see Elec. | Modify Existing and New |
| 26.3 | Lighting System | | | | | | |
| | 1. Emergency Lighting System | Y | Both | Mighton | GC/Electrical Trade | see Elec. | Provide new & alter existing |
| | 2. Interior lighting system | Y | Both | Mighton | GC/Electrical Trade | see Elec. | Provide new & alter existing |
| | 3. Exterior lighting system | Y | Both | Mighton | GC/Electrical Trade | see Elec. | Provide new to exist. System |
| | 4. Special purpose lighting | Y | New | Mighton | GC/Electrical Trade | see Elec. | Room occupancy system |
| 26.4 | Lighting Management Systems | | | | | | |
| | 1. Occupant & Daylight Sensing System | Y | New | Mighton | GC/Electrical Trade | see Elec. | New and modify local control |
| | 2. Lighting Automation System | N | - | - | - | - | not applicable |
| 26.5 | Electric Heating Systems | Y | Exist. | - | - | - | Protect exist. As may be req'd. |
| 26.6 | Special Systems | | | | | | |
| | 1. Battery power system (UPS) | Y | New | Owner | - | - | by Owner's Forces N.I.C. |
| | 2. Lightning Protection System | N | - | - | - | - | not applicable |
| 27 | Communication Systems | | | | | | |
| | 1. Data Systems | Y | alter | JMA/Mighton | GC/Electrical Trade | Div. 27 | Rough-in of conduit & wiring |
| | 2. Voice Systems | Y | Exist. | - | GC/Electrical Trade | Div. 27 | Protect exist. As may be req'd. |
| | 3. A/V Systems | Y | New | JMA/Mighton | GC/Electrical Trade | Div. 27 | Rough-in of conduit & wiring |
| | 4. Public Address System | Y | Exist. | JMA/Mighton | GC/Electrical Trade | Div. 27 | Protect exist. As may be req'd. |
| | 5. Centralized Clock System | N | - | - | - | - | not applicable |
| 28 | Electronic Safety and Security Systems | | | | | | |
| | 1. Fire Alarm System | Y | Alter | Mighton | GC/Electrical Trade | see Elec. | Extend & modify to suit fit-up |
| | 2. Security System | Y | Alter | JMA/Mighton | GC/Electrical/Sec | Div 28 | New Access Controls & CCTV |
| 29 | Reserved | | | | | | |
| 30 | Reserved | | | | | | |
| 31.1 | Site Grading and Drainage System | | | | | | |
| | 1. Surface Drainage System | Y | Exist. | - | - | - | not applicable |
| | 2. Storm Sewerage System | Y | Exist. | - | - | - | not applicable |
| | 3. Erosion and Sedimentation Control System | Y | Exist. | - | - | - | not applicable |
| | 4. Perimeter Drainage System | N | - | - | - | - | not applicable |
| | 5. Stormwater Infiltration System | N | - | - | - | - | not applicable |
| 32.1 | Site Finishes System | | | | | | |
| | 1. Hardscaping | Y | Exist. | - | - | - | not applicable |
| | 2. Landscaping | Y | Exist. | - | GC | - | Protect exist. As may be req'd. |
| 33.1 | Site Water Supply System | Y | Exist. | - | - | - | Existing to remain |
| 33.2 | Site Fire Suppression Water System | Y | Exist. | - | - | - | Existing to remain |
| 33.3 | Site Sewage System | Y | Exist. | - | - | - | Existing to remain |
| 33.4 | Septic System | N | - | - | - | - | not applicable |
| 33.5 | Site Electrical, Electrical Service System | Y | Exist. | - | - | - | Existing to remain |
| 33.6 | Site Communication System(s) | Y | Exist. | - | - | - | Existing to remain |
| 34-50 | Reserved | | | | | | |

1. GENERAL

Bidders are reminded that requirements for removals and select demolition are included in this Section but pertain to the work of all trade contractors and systems in the Work and existing Facility. All bidders shall inspect the Reference Documents as well as architectural, structural, mechanical, and electrical removals drawings. Include all work and services identified or reasonably inferable from the Reference Documents and the drawings, Division 1 of the Specification, and this Section in the bid cost, Contract Amount, and design for accomplishment of the Contract Time.

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated herein.
2. This specification section describes methods and standards. It is not a separate portion of the Work that shall be performed by either the Contractor's own forces or a single demolition trade. All items that are to be salvaged or refurbished for re-use in the finished Work or handover to the Owner shall be removed under the direction of the qualified trade contractor that will be refurbishing and re-installing the item or providing similar work in the Contract (for example, electrical), without exception.
3. The Contractor is specifically cautioned that the performance standards and skills required of all trades and Contractor's own forces performing demolition and removals work for salvage must be to the standard necessary for effective dismantling of items of the existing building, to maximise the possibility for re-use of such items with minimal refurbishment. This includes but is not limited to fixtures and fittings, luminaires and surface finishes.
4. The Contractor shall photograph all portions of the existing building extensively prior to beginning any removal or demolition, sufficient for later reference in the renovation of the facility. Label all salvaged components for location and reuse using methods that will not fade or fall off unless actively and purposely removed, to surfaces that will not appear in the finished Work.
5. The Work requires a thorough cleaning of the existing building to areas under the Contractors control, as described herein, as well as maintenance cleaning to portions of the existing mechanical and electrical systems that will remain in the completed Work.
6. The Contractor shall include for all prices and work inferred by the Documents, in both base bid and supplemental pricing. This includes removal and demolition of existing portions of the Facility, building, or site that are necessary to perform work described by the Documents for both base bid and supplemental bid forms. No further costs will be considered for such work, as this work is included in the Contract Price, all bid prices, and the Contract Time.

1.2. Related Requirements

1. Selectively demolished and salvaged items shall be removed using standards of applicable sections of the specification that describe the building systems, material or product being demolished or salvaged. This includes compliance with Contract requirements in Division 1 and elsewhere for recycling of removed or demolished materials and products.
2. Undertake operations in strict conformance with the requirements of Section 017042 Construction Waste Management and Disposal and requirements of the OHSA and other applicable legislation. All removed and demolished items shall be recycled unless the Contractor can demonstrate that there is no recycling operation within 100 km of the Place of the Work that will accept the demolished item.
3. Further requirements for demolition and salvage of items for refurbishment and re-use in the Work are described in individual sections of the specification and on the drawings. The

Contractor shall review such requirements and co-ordinate bidding so that all work required by the Contract is included, and priced once in a co-ordinated manner.

4. Selective demolition and/or salvage of mechanical or electrical systems and components is also described in the mechanical and electrical Documents.

1.3. Notices of Interruption and Organization for Minimal Disturbance

1. Notify Consultant and obtain Owner acceptance before each disruption of site access or services, or existing building systems. Co-ordinate all interruptions for minimal disturbance and as necessary to conform to the required Sequence of Construction and the Owner's Operations, Safety, and Security Conditions.

1.4. Definitions

1. The word "*remove*" or "*demolish*", where appearing in the Documents, means: to provide any shoring and temporary measures required for safety; to demolish in accordance with the selective demolition procedure established by the Contractor in accordance with all applicable law; to remove and recycle all material, dispose of all debris and to make good existing surfaces adjacent and in the area of the removal to match conditions prior to removal.
2. The word "*salvage*", where appearing in the Documents, means to remove for the purposes of re-use. It includes, but is not limited to, taking necessary steps to remove and store fasteners and to maintain salvaged material in good condition for re-use. Where necessary, demolish around salvaged material as required in order to maintain the salvaged material in good condition upon removal, and make good such damage to existing conditions.

1.5. Scope of Work for Demolishing and Salvaging of Existing Elements

1. Selective Demolition includes but is not limited to the following:
 1. all work indicated on Removals Plans and Select Demolition Drawings, wheresoever located;
 2. all cutting and patching to accomplish other aspects of the Work, whether indicated on drawings or not, including as necessary to install new work in existing ceiling, slab, floor, wall, or partition spaces, with restoration of same;
 3. all removals required for temporary relocation of items during construction;
 4. all mechanical and electrical removals and relocations required to accomplish the Work, including relocations of existing power, water, telephone and data where such items are to remain functional during the Contract Time and /or the finished Work;
 5. all temporary dust and sealed enclosures and protection of existing systems to ensure that demolition operations do not affect adjacent portions of the Facility or existing systems..
2. Removal of items and selective demolition includes associated wiring, conduit, piping, controls, bedding, and accessories located in the area or connected to such items, with appropriate decommissioning and removal back to nearest branch point of the system, unless specifically noted otherwise.
3. The drawings show the general intent of demolition and salvage of existing elements to accommodate the intended work of this Contract and the work of future contracts in the Project. Further and specific performance criteria for this demolition and salvage or disposal are indicated in this specification section and in specific sections associated with the discipline of work or building system affected by the removals.
4. All costs for temporary protection, mobile equipment, platforms, or other measures required to effect the demolition, maintain public and worker safety, and salvage or disposal are included in the Contract Price.
5. Demolition and salvage or disposal shall be undertaken to suit the required schedule for completion and the required sequence of construction. Note that removals and selective

demolition shall occur in strict accordance with the required Sequence of Construction, and may require multiple mobilization to the site and restoration of areas during the Construction Period. Pay all costs and include all work required to achieve the intent of the Sequence of Construction. Immediately upon completion of demolition or removals the area shall be readied for the next phase of the Work and new work installed.

6. Disconnect and protect existing services and systems using methods described in Mechanical and Electrical drawings and specifications and as necessary for the Work. Salvage all devices and wiring, including fibre optic cabling, where identified for re-use or delivery to the Owner.

1.6. Schedule of Items

1. Co-ordinate the work to ensure that all required selective demolition is performed and included in the bidding and Contract price. The following list of items required for demolition is not complete. Review the documents and provide all removals necessary for the Work.
2. Remove and demolish and dispose of the following:
 1. All items required for cutting to achieve systems distributions within interior portions of exterior walls;
 2. Partitions, ceilings, flooring, flooring adhesives and similar, all as shown on Removals drawings or necessary for the Work;
 3. All removals of sprinkler, electrical and mechanical systems except where indicated for re-use or alteration, and as required to maintain feeds to the existing Facilities.
3. Salvage the following for refurbishment and re-use:
 1. All equipment, all miscellaneous metal items indicated for re-use in the Work
 2. Metric ceiling tiles from Phase 2 area, for re-use and handover of remainder to Owner;
 3. Devices, structures, wiring, piping and conduit in the existing services where such elements may be proposed for re-use in the Work by credit to the Contract Price, unless the item is specifically noted for re-use in the Work.
 4. All electrical and mechanical devices within demolished areas of existing building, for handing over to the Owner or disposal as the Owner may decide; and
 5. Acoustic panels of existing suspended lay-in ceiling system in Phase 1 Area, for spot replacement of stained or damaged panels in existing ceilings scheduled to remain and /or for modification. This includes removal and re-installation of all ceiling tiles in this area as required for other work occurring above or near the ceiling level.
4. Removal of items includes associated wiring, conduit, piping, controls, and accessories unless noted otherwise. Demolition of partitions and ceilings includes demolition of all items located within same, and tie-off and removal of redundant feeds, supports, and lines.
5. Provide all removals, relocations, and re-installations required to facilitate work to the existing structural system of the building, whether below grade, at grade or floor or roof level. This includes removal of adjacent elements of the existing facility, building, or site that require removal to facilitate further work to the existing structure or building.
6. Provide all temporary protection of existing portions of Building Systems that are to remain in the finished Work and the renovated area, including but not limited to equipment, wiring and components of Datacom, Telecom, Door Access Control, and Security Systems. Do not proceed with demolition until all such wiring and elements have been identified and protected for the full duration of this Project.

1.7. Scope of Work for Cleaning of Areas of Existing Building Affected by the Work

1. The work described by this Section includes for a thorough cleaning of all surfaces in the existing buildings that are adjacent or part of areas receiving select demolition, that will be exposed in the finished Work. As such, it is expected that cleaning operations will be undertaken initially to remove all dust, grease, sediment, deposits, and grime from surfaces

within or on the building whether in former ceiling spaces or in occupied levels of the building, **immediately upon completion of select demolition activities**. Surfaces include, but are not limited to:

1. All interior slab, floor, wall and ceiling surfaces within areas under the control of the Contractor and where such surfaces have been affected by the Work.
2. All costs for consumables, temporary protection, electrical shutdowns and temporary lighting, mobile equipment, platforms, or other measures required to effect the cleaning are included in the Contract Price.
3. The cleaning described by this Section is distinct from construction and final cleaning described in Division 01, and shall not be undertaken as the same operation as final cleaning prior to handover to Owner. Additionally and further, upon Substantial Performance of the Work all areas of the completed Work and routes used by Contractor for access to the Place of the Work, including existing areas to remain and for alteration, shall be free of accumulated dust and grime, and clean, in accordance with Division 01 requirements.

1.8. Submittals

1. Submit as described in Division 1:
 1. Submit design calculations and structural drawings for shoring and underpinning before proceeding with demolition or breaking out of load bearing walls or other structural elements requiring shoring. Provide to authority having jurisdiction shoring and underpinning drawings prepared by qualified professional engineer registered or licensed in the province of Ontario showing proposed method.
 2. Submit a description of proposed cleaning methods for the various aspects of cleaning required by this Section, including proposed products used and methods of disposal.

1.9. Reference Standards

1. Comply with National Building Code, Part 8, Construction Safety Measures at Construction and Demolition sites, and Province of Ontario requirements, for strictness measures in each case.

1.10. Basic Execution Requirements

1. Protection
 1. Prevent movement, settlement, or other damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.
 2. Protect building systems, services and equipment.
 3. Provide temporary dust screens, covers, railings, supports and other protection as required, including protection of electrical devices and equipment from operations.

1.11. Identification of Building Systems

1. The work described by this Section and selective demolition described in other sections is related to the following Building Systems as defined in Section 019010. Comply with requirements for performance, review, and co-ordination of such systems:
 1. Emergency Egress System
 2. Fire Separation Systems
 3. Barrier-Free Path of Travel System
 4. Environmental Separation Systems; floor, roof, wall and curtainwall subsystems;
 5. Interior Finishing System
 6. Mechanical and Electrical Systems, Communication and Security Systems

2. PRODUCTS

2.1. Products and Materials for Selective Demolition and Cleaning

1. It is the intent of this Section that selective demolition and cleaning operations, including removal of finishes from existing substrates for refinishing in the Work, shall employ methods, materials and products that are safe, non-toxic, substantially odourless, and designed for minimal dust generation. Do not use invasive or harsh products that may harm adjacent elements, existing items or elements for re-use, or create waste for disposal that is designated as a result of the use of such potentially toxic or designated materials or substances.
2. All slab grinding, cutting of slabs, and cutting or coring of masonry or concrete shall be with wet-cut methods and shall use equipment with protective shields and vacuum attachments.

3. EXECUTION

3.1. Preparation at Each Construction Phase

1. Confirm, disconnect and re-route service lines entering areas and portions of the Areas in both Phase 1 and 2 to be selectively demolished, working as separate mobilizations and operations to suit the required sequence of construction. Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition. Call for GPR of floor slabs for areas of slab cutting and perform this work wherever slabs are to be cut. Inspect underside of suspended slabs for the presence of services before cutting. Pay all costs for this work.
2. Disconnect and cap designated services within the area for selective demolition:
 1. Electrical supply lines: remove in accordance with electrical code requirements for cutting back to panel and removing wiring, for alterations to systems
 2. Sanitary and water lines: remove as required for alterations to systems.
3. Do not disrupt active or energized utilities designated to remain undisturbed.
4. Owner will remove all loose furnishings to areas for selective demolition in the areas of each Phase prior to handing over the area to the Contractor. The Contractor shall protect any remaining existing FF&E from damage during the course of the Work.
5. Areas of the Facility that are to receive select demolition are generally adjacent to areas to remain occupied. Perimeter of the area for demolition must be fully protected from dust and noxious fumes, with dust-proof partitions sealed to the slabs and underside of deck above, or similar methods acceptable to the Owner and Tenant.
6. Preserve means of egress to stairwells and exits for occupied areas of the Floor Area, and perform demolition in these areas outside of Owner's working hours.
7. Clean existing concrete slabs left exposed or to receive carpeting and applied floor finishes. Grind existing concrete floors in their entirety to remove all mastics, grout and adhesives in preparation for the application of new flooring finishes.

3.2. General

1. Perform the stipulated demolitions of the existing building in strict accordance with the required Sequence of Construction and to achieve the Construction Schedule requirements.
2. At end of each day's work, leave work in safe, weathertight, and stable condition.
3. Remove all materials using forces knowledgeable and qualified to undertake work on the particular item being removed. Co-ordinate removals to minimise interferences amongst the

items, and remove and re-install at no cost to Owner those items that must be temporarily removed to gain access to items required to be demolished.

4. Confirm and layout locations and extent of selective demolition prior to performing same.
5. Perform selective demolition with due care for item to be salvaged. Store items for re-use or to be delivered to Owner away from the weather in a secure location where they will not be damaged. The Contractor shall make good any damage at its own expense.
6. Perform all selective demolition work identified on the Drawings and in this Section.
7. Perform all selective demolition work required to adapt existing conditions to the finished requirements of the work, whether explicitly shown in removals drawings, elsewhere in the documents or not, where such work may be reasonably inferred as necessary to accomplish the finished Work described by the Documents. This includes partial removal and reinstallation of ceilings, suspension systems, and similar as are necessary to facilitate installation of piping, ducting, conduit or to accommodate lifts for access to ceiling spaces and work.
8. All equipment, products and fixtures removed become property of the Owner, until such items are specifically identified by the Owner as designated for disposal or recycling. Remove equipment and items with due care for value and eventual re-use by the Owner unless the specific item has been specifically identified by the Owner as designated for recycling or disposal. Protect and store items in appropriate conditions at a designated site location, not in-situ, to ensure their security and request review by the Owner's representative. Hand over in clean condition all items identified by the Owner as salvaged items, and cooperate with the removal of such items by Owner's forces.
9. All products, and materials that are declined for salvage by the Owner become property of the Contractor. Recycle, dispose, and remove such items, at no cost to the Owner.
10. Do not encumber the site with materials. Sale of materials in situ or from site is not permitted.

3.3. Demolition, Salvage and Disposal

1. Remove parts of existing buildings and demolish and dispose, and to permit salvage of existing elements for re-use, and to permit new construction. Sort materials into appropriate piles for recycling and reuse.
2. Remove items to be reused, store as directed by Consultant, and reinstall under appropriate section of specification. Such removals shall be performed by the trade contractor that will refurbish and /or re-install the material or item. Disassemble items only as necessary to remove from the existing site for later examination, dismantling, and refurbishment in shop conditions.
3. Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction. Pay all costs for removal, recycling, salvaging and /or disposal.

3.4. Recycling, and Disposal included in Base Bid

1. Include all recycling and disposal work at no further cost to the Contract. All removed materials and Products shall be recycled or disposed unless specifically identified by Owner for salvage and handover, or for re-use in the Work.

3.5. Cleaning Operations

1. Immediately upon completion of selective demolition to building, perform cleaning operations described in this Section as necessary to clean all surfaces within and on the existing building. Perform this cleaning operation after selective demolition of floor slabs, grinding or cutting of concrete or block, and all cutting operations that may produce dust. Clean prior to removal of temporary dust-proof partitions and temporary protection at perimeter of areas under the Contractor's control.

2. Perform cleaning operations for minimal disturbance and dust generation. Equipment shall be industrial power vacuum including wet vac type equipment for immediate drying and removal of moisture generated by cleaning operations. These methods shall be supplemented by wet methods involving environmentally-friendly degreasing and cleaning products where necessary to ensure complete removal of grease and grime. Do not use TSP.
3. "Clean" shall mean free of dirt, grease and grime, and free of all loose scale and deposits. Where existing surfaces are to be cleaned it is not intended that they be returned to "as-new" condition. Notwithstanding, ensure removal of all grease and deposits to achieve best finish possible, using methods appropriate to the existing conditions encountered.
4. Upon completion of cleaning operations provide protections to surfaces to ensure that upon completion of the Work and final cleaning (as performed to standards and requirements of Section 017041) the site and building are handed over to the Owner in pristine and clean condition in accordance with Division 01 requirements and the General and Supplemental Conditions of the Contract.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|--|---------------------------|
| 1. Selective Demolition | Section 024119 |
| 3. Cast-in-Place Concrete | Section 033000 |
| 4. Masonry | Division 04 |
| 5. Architectural Metal Fabrications | not applicable |
| 6. Wood, Plastic, and Composites | Division 06 |
| 7. Thermal and Moisture Protection | Division 07 |
| 8. Fire and Smoke Protection Systems | Section 078400 |
| 9. Painting and Coating | Section 099000 |
| 10. Installation of Owner-Supplied Equipment | Divisions 10 and 11 |
| 11. Wall and Corner Guards | Section 102600 |
| 12. Mechanical | see Mechanical Documents. |
| 13. Electrical | see Electrical Documents. |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Detailed shop drawings showing articles to be fabricated, including any shop work for holing, forming, and preparation. Submit drawings, designs, and details for guards, stairs, ladders, railings and any similar bearing the stamp of a structural engineer licensed to practice in the Province of Ontario.
 2. Show profiles, members, fastenings, thicknesses, finishes and other pertinent data.

1.4. Schedule of Items Required by the Contract and Described by this Section

1. Provide all articles, materials, equipment, labour, transportation and incidentals noted, specified, or reasonably inferable as required, to complete the supply and erection of all metal fabrications work to the extent of the Contract Documents.
2. Carefully examine the Contract Documents to ensure that all metal fabrications are provided.
3. Brackets for device, equipment, service piping and conduit mounting are described in the Mechanical and Electrical Divisions. Contractor shall co-ordinate division of work between Trade Contractors for support and fastening of equipment and systems for the Water Supply System, the Sanitary Sewage System, the Storm Water System, the HVAC System, the Electrical Distribution System, Fire Alarm System, and the Electrical Systems for communications and security. Provide all items necessary for the Work.
4. Provide all metal fabrication items shown on the drawings, and as specifically mentioned in this specification, including but not limited to the following:
 1. Bracing, where not identified elsewhere.
 2. Support Brackets, where not described elsewhere.
 3. Track support within ceiling spaces for ceiling suspended architectural items, whether shown on drawings or not, unless such support is specified for provision by light gauge steel framing of Section 054100 or is shown on structural drawings for provision by Section

052100.

4. Sleeves for mechanical or electrical penetrations in masonry, sized to suit fire-stopping requirements in addition to size of element passing through sleeve.
5. Concealed support for finished carpentry items constructed to Section 062000.
5. Supply other Sections with instructions, and if required, templates, necessary for accurate setting of inserts and components. Supply items for building into the work described in other Sections in a timely fashion, in accordance with the Contract Schedule.
6. Provision of concealed reinforcement members within window or interior screen system members unless specified in window and entry specification sections.
7. Retaining angles required by fire dampers and fire stops in ductwork are provided by the Mechanical Trade Contractor.

1.5. Co-ordination with Other Trades

1. As the Work progresses, supply anchor bolts, templates, bearing plates, straps, and other members required by the Documents to be built into work described elsewhere. Ensure co-ordination, together with the necessary data and drawings for setting.
2. Co-operate with all engaged in the Work and ensure all necessary instructions and information with regard to materials or items supplied and/or provided as described herein is provided to such forces installing items.
3. Supply loose lintels and other loose steel members for erection described elsewhere in the Contract Documents.
4. Materials required to be built in with work described elsewhere in the Contract Documents shall be delivered to cause no delay to that work.
5. Where work involves penetration of the exterior enclosure, such work shall be performed in close cooperation with enclosure trades and connections shall be designed for movement and tolerances expected in the service life of the connection.

1.6. Quality Control

1. Rejections: Defective materials or quality of work whenever found at any time shall be rejected, regardless of previous inspection. Inspection is not to relieve this Contractor from responsibility, but is a quality control procedure for the Owner's benefit and a precaution against oversight and errors. Defective materials shall be removed and replaced by this Contractor at his own expense, without change to the Contract Time.
2. The work of this section is generally not exposed in the finished Work. Do any work exposed in the finished Work to the standards required for architectural metal, in Section 057000.

1.7. Basic Product Requirements

1. Quality Assurance

1. Work shall be undertaken by shop forces having the necessary fabrication skills for the items. Submit qualification and experience of shop upon request of Consultant.
2. Qualifications of Welders: certified under CSA W47.1-09 (R2014) for appropriate class of work.
3. Fasteners to exterior work shall be stainless steel u.n.o.

1.8. Basic Execution Requirements

1. Delivery, Storage and Handling

1. Deliver, handle and store fabricated components to prevent permanent distortion, corrosion and damage.

2. Protection

1. Provide protective covering as necessary to ensure items are not damaged during shipping, installation, and leave in place until final cleaning of building or until directed by Consultant to remove. Replace items damaged without cost to Owner at Consultant's discretion.
3. Do not shop prime paint or hot-dip galvanise any item on a surface that will be exposed in the finished work unless designated for galvanising. Primers for interior items exposed in the finished work shall conform to the requirements of Section 099000 for metal substrates. Standard steel fabrication shop primer is not acceptable for such items.

1.9. Warranties

1. Warrant in accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended.

1.10. Building Systems Requirements

1. The work described by this Section is related to the following Building Systems as defined in Section 019010. Comply with requirements for performance, review and co-ordination of such systems:
 1. Building and Site Structural Systems;
 2. Mechanical and Electrical Systems;
 3. Environmental Separation Systems;
 4. Interior Finish Systems.

2. PRODUCTS

2.1. Materials

1. All structural steel components, to requirements of this section, for fabrication of load-bearing brackets and supports as required throughout the work, and additionally:
2. Steel sections and plate: CAN/CSA-G40.21-13, Grade 300W.
3. Steel tube: CAN/CSA-G40.21-13, Grade 350W.
4. Steel pipe: ASTM A53-12, Type E, Grade A.
5. Sheet steel: hot dip galvanized, cold rolled, with stretcher level degree of flatness to ASTM A653-15; zinc coating designation Z275.
6. Expanded metal lath: flattened expanded carbon steel mesh: Dramex 20 mm #9(10)F.
7. Pipe for sleeves: Schedule 40 black, to suit holing and firestopping requirements.
8. Welding materials: CSA W59-13 UP4.
9. Shop coat paint shall conform to requirements of Section 099000 for all steel that will be exposed in the finished work. The Steel Trade Contractor and Contractor are specifically cautioned that shop paints to CGSB standards and normal industry practice are not acceptable for such

steelwork.

10. Ferrous Metal Primer for steel not exposed in the finished work: to CAN/CGSB-1.40-M.
11. Zinc rich shop paint:
 1. Shop coat: Inorganic Coating No. 5536/5537 by Glidden, Galvafroid by W.R. Meadows, or equivalent product by other manufacturer accepted by Consultant.
 2. Field touch up: CAN/CGSB 1.181-02
12. Non-shrink grout: Por-Rok by Hallemite Products Ltd., or SET 15 Minute Anchoring Cement by SET Products Ltd.
13. Stainless steel: ASTM A167 and ASTM A269-15, Type 302 or 304, brushed finish standard, or as indicated on drawings, of sufficient thickness for intended application.
14. Aluminium:
 1. Plate, sheet: AA1100 alloy, anodizing quality.
 2. Extrusions: AA 6063-T5 or T6 alloy.
 3. Aluminium welding material: CSA W59.2-M1991 (R2013).

2.2. Design

1. Design, detail and supply all connections to develop the strength of connection required by governing codes and the OBC, and additionally to provide the architectural appearance required by the standards of this specification.
2. Unfilled stitch welds, puddle welds, connection methods that deform members, and other unsightly joint practices are not acceptable.

2.3. General Fabrication

1. Fabricate components in the shop in largest size practicable to minimize field jointing.
2. Where possible, fit and shop assemble work, ready for erection.
3. Fabricate work square, true, straight, free from warpage and other defects. Accurately cut to required size, with joints closely fitted and properly secured. Machine file and fit joints, corners, copes and mitres.
4. Reinforce fabricated components to safely withstand expected loads.
5. Make joints in built-up sections with hairline joints in least conspicuous locations and manner.
6. Make allowance for thermal expansion and contraction when fabricating exterior work.
7. Joints shall be welded unless otherwise indicated and unless details of construction do not permit welding. Exposed welds shall be continuously filled, blended, and shall be ground to ensure welds do not appear in the finished work except as radiused changes of material plane.
8. Close exposed open ends of tubular members with welded on steel plugs.
9. Where work of other Sections is to be attached to work of this Section, prepare work by drilling and tapping holes, as required to facilitate installation of such other work.
10. Work of this Section, supplied for installation under other Sections, shall be prepared as required ready for installation by: drilling countersinking and tapping holes, forming shapes and cutting to required sizes.
11. Grind off mill stampings and fill recessed markings on steel components left exposed to view.

12. Clean and prepare structural steel members for finishing. Exposed members shall receive preparation to CISC Guide for AESS Category 2.
13. Follow recommendations of AISI Committee of Stainless Steel Producers when fabricating, joining, welding, and finishing stainless steel components. Remove heat discolourations with mechanical, chemical or electrochemical means. Provide temporary protective coverings of all stainless steel components.
14. Ensure exposed edges and connections that are exposed in the finished installation are reviewed and accepted by the Consultant prior to beginning fabrication work.

2.4. Steel bracing for Interior Architectural Elements and Miscellaneous Items

1. Fabricate all miscellaneous items, including anchorage and built-in brackets and plates, as indicated in drawings, as identified in the schedule of items described in this Section, and as reasonably inferable as necessary for the completion of the Work.
2. Provide bracket supports to connect elements to the building structural system for equipment, overhead door tracks, lighting, equipment, and ceiling mounted items within steel joists and steel framing, in strict co-ordination with the respective electrical and mechanical trades.
3. Provide miscellaneous inserts, clips, and brackets for anchorage of windows, doors and frames, where not supplied by the frame, door, or window supplier.

2.5. Masonry Lateral Support Brackets

1. Not applicable this project.

2.6. Finishes

1. Thoroughly clean steel of loose scale, rust, oil, dirt and other foreign matter. Suitably prepare steel surfaces by power tool cleaning to receive specified finishes.
2. Grind smooth sharp projections.
3. Remove oil and grease by solvent cleaning.
4. Apply coatings in the shop and before assembly. Where size permits, galvanise components after assembly.
5. Hot dipped galvanize (unpassivated) components where so indicated after fabrication in accordance with requirements of ASTM A123M-15, minimum coating weight 380g/m².
6. Galvanizing: hot dipped Z275 galvanizing with zinc coating only for items not exposed in the finished work.
7. Shop apply coat of primer to interior components after fabrication except where stainless steel, galvanized, or zinc rich paint finish is required.
8. Exterior components except where required to be hot dip galvanise: blast clean metals to "Near White Grade" (SSPC-SP-10) and spray apply a coat of zinc rich paint maximum 3 mils thick.
9. Bituminous paint: to CAN/CGSB-1.108, for backpaint of surfaces hidden in the work.

2.7. Isolation Coatings

1. Apply coat of bituminous enamel to contact surfaces of metal components in contact with cementitious materials and dissimilar metals.

3. EXECUTION

3.1. General

1. Supply all required metal fabrications as listed herein, as indicated on drawings, and as reasonably inferred as necessary for the complete and finished Work, for installation in conjunction with the work described in other sections of the specification.
2. A partial list of items is additionally noted in Part 1 of this Section. Provide all such items.
3. Install all miscellaneous framing revisions to structural systems and make all connections.

3.2. Schedule of Miscellaneous Connector and Fastening Items

1. Supply deformed anchor bolts, fastening inserts and other similar items for casting into concrete foundations, or for setting into masonry, as indicated on drawings and necessary for the Work.
2. Supply any and all inserts required for fastening of hardware, for building in or fastening to masonry or wood, as the case may be. Supply items such that they will not be exposed in the finished Work.
3. Supply clip angles in steel and/or aluminium as required to support door and window frames and thresholds, where not described in other Sections, for installation by the Trade Contractor providing the supported item.

3.3. Installation

1. Install components plumb, square, straight and true to line. Drill, cut and fit as necessary to attach this work to adjoining work.
2. Provide temporary supports and bracing required to position components until they are permanently anchored in place.
3. Securely anchor components in place; unless otherwise indicated, anchor components as follows:
 1. To concrete and solid masonry with expansion type anchor bolts.
 2. To hollow construction with toggle bolts.
 3. To thin metal with screws or bolts.
 4. To thick metal with bolts or by welding.
 5. To wood with bolts or lag screws.
4. Provide all components and bent plate required for anchoring and to form upstand parapets at roof edges. Make anchoring in concealed manner wherever possible. Make exposed fastenings, where accepted by Consultant, neatly and of same material, colour, texture and finish as base metal on which they occur. Keep exposed fastenings evenly spaced.
5. Dissimilar metals and metals in contact with cementitious elements shall have contact surfaces coated with bituminous paint or be isolated by other means as accepted by the Consultant.
6. After installation, clean and refinish injured finishes, welds, bolt heads and nuts. Refinish with zinc rich paint or primer to match original finish.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|--|----------------------|
| 1. Requirements for Temporary Measures | Division 01 |
| 2. Rough Carpentry for Demolition Works | Division 02 |
| 3. Metal Fabrications | Division 05 |
| 4. Finish Carpentry | Section 062000 |
| 5. Architectural Woodwork | Section 064000 |
| 6. Fire and Smoke Protection Systems | Section 078400 |
| 7. Openings | Division 08 |
| 8. Non-Load Bearing Studs and Boardwork | Section 092000 |
| 9. Specialties, for Blocking and Support | Divisions 10, 11, 12 |
| 10. Mechanical Work | Mechanical Documents |
| 11. Electrical Work | Electrical Documents |

1.3. Special Project Requirements

1. It is the intent of this Section that rough carpentry work be performed strictly as required to accomplish the construction sequencing and scheduling, in cooperation with the trade contractors performing other aspects of the Work.
2. The work of this section may not proceed as one continuous operation, but in many increments. Include all costs for such an approach to the Work.
3. Provide all carpentry work required by Division 1 of the specification, unless specifically provided by a trade contractor as an integral part of the trade contractor's work. In all cases, regardless of division of Contractor's forces and contracts, all work shall be performed to standards identified in Division 1 and this Section. The Contractor is cautioned that blocking, support, furring, and other items specified for support, necessary for the Work, and required in the Contract are not shown on drawings.
4. The work of this Section includes all materials and work to provide temporary protection of other portions of existing facility, and separation of construction areas in accordance with the Contractor's Construction Plan, the sequencing requirements for the Work, Division 1 requirements, and the Contractor's Safety Plan.
5. Generally, but without limitation, this Section describes work required by the Contract for:
 1. Use of wood to form aids, temporary protection, barriers, guards, ladders and temporary stairs, tree preservation, hoardings, scaffolds, ladders, dust-tight partitions, temporary weathertight barriers, and other Division 1 requirements.
 2. Forms and forming where not performed by the concrete trade contractor.
 3. Selective demolition of wood in existing portions of the facility, and making good adjacent such demolition as described in Section 024119.
 4. Blocking, reinforcement, and provision of wood backup in wall, partition, and soffit assemblies for other elements in such assemblies and for mounting of panels, equipment and specialties.
 5. Ply substrates behind boardwork and elsewhere for equipment and window covering mounting.
 6. Ply sheathing underlayment layers & gussets to partitions, walls and assemblies.
 7. Ply backerboards where not provided by other trade contractors.
 8. Jamb and head reinforcement to rough openings in the enclosure systems to reinforce

- openings and facilitate installation of frames or adjacent construction with proper clearances for return of components behind frames.
9. New bucks and reinforcement at interior door openings and screens and windows in steel stud partitions, to strengthen partitions at openings.

1.4. Reference Standards and Codes

1. CSA B111-1974 (R2003) Wire Nails, Spikes and Staples.
2. CAN/CSA-G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
3. CAN/CSA-O141-05 Softwood Lumber.
4. CSA O151-09 Canadian Softwood Plywood.
5. National Lumber Grades Authority Standard Grading Rules for Canadian Lumber 1991.
6. Baltic full veneer ply, in thicknesses and sizes suitable as site-applied glue laminated backing for building up and establishing smooth curved portions of partitions, unless such partitions are specifically noted for gypsum wallboard.

1.5. Basic Product Requirements

1. Quality Control:
 1. Work of this Section shall be undertaken by journeymen carpenters able to demonstrate applicable experience to the satisfaction of the Consultant and the Owner.
 2. Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board, or by sample to acceptance of Consultant together with submittal of product origin.
 3. Plywood identification: by grade mark in accordance with applicable CSA standards.
 4. Materials supplied under this Section shall be selected by Contractor for minimum 50% FSC certified material on a supply cost basis.
2. Delivery, Storage, and Handling:
 1. Materials must be stored off the grade surface, and supported frequently so as to retain straightness of members. Protect materials from weather using appropriate means, but take care to ensure that materials receive air circulation. Provide spacing members at 400mm vertically throughout stacks.
 2. Store materials safely, keeping in mind the possibility of vandalism and climbing by intruders.

1.6. Basic Execution Requirements

1. Perform execution to the requirements of Division 1.

1.7. Warranties

1. In accordance with Division 1 requirements and GC12.3.1. and 12.3.4 as amended.

1.8. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance

requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:

1. Building Structural System, to receive loads of other systems components and transfer to the structural system, as described in Section 019550
2. Interior finish systems, to provide support for partitions, doors and windows, screens, fitments, and accessories.

2. PRODUCTS

2.1. Lumber Material

1. Lumber not exposed in the finished work: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
 1. CAN/CSA-O141-05.
 2. NLGA Standard Grading Rules for Canadian Lumber.
 3. Lumber shall be S-P-F No. 1 or No. 2. Stud grade not acceptable.
 4. Lumber shall be minimum 50% FSC certified material on a supply cost basis.
2. Plywood:
 1. All locations except backboards: Douglas Fir Ply to CSA 0121-M1978 Un-sanded Sheathing Grade, exterior sheathing grade.
 2. Backboards: Douglas Fir Ply to CSA 0121-N1978, Sanded Grade, solid two sides, fire retardant pressure-treated.
 3. To curved partitions, full solid veneer Baltic ply in 3 mm or 6 mm thickness to suit radius of curves by glue laminating layers of ply.
3. Furring, bridging, blocking, nailing strips, grounds, strapping, curbs, fascia backing and sleepers, all not to be exposed in the finished work:
 1. CAN/CSA-O141-05.
 2. NLGA Standard Grading Rules for Canadian Lumber.
 3. S-P-F No. 1/2 or better, S-GRN. Commercial and Stud grades are acceptable provided that individual pieces are selected for conformance to higher grades in exposed locations and other pieces are used in concealed locations only.
 4. Materials for these uses may be re-used cut-offs or recycled lumber acceptable for the use intended, or minimum 50% FSC certified material on a supply cost basis.
4. Structural Wood exposed in the finished work: S-P-F No. 1/2 or better.
5. Other wood exposed in the finished work: to requirements of Section 062000.

2.2. Wood Treatment

1. Preservative pressure treated components: to latest Canada Green Council standards. Use of pressure treated material shall be minimized, and shall be confirmed with the Consultant prior to any use in the Work. Under no circumstances use pressure-treated lumber to the interior of the building.
2. Fire retardant pressure treated components: to CSA 080-M1983 for maximum flame spread of 25

and labelled by ULC. Use for all backerboards and boards in IT, Electrical, and Mechanical Rooms.

3. Surface cut, bore and trim components to sizes required as much as possible prior to treatment.

2.3. Accessories

1. Nails, spikes and staples: to CSA B111, hot dip galvanised steel for exterior work including components located in exterior walls and roofs; bright finish steel in all other locations. Unless otherwise indicated use common spiral flathead nails.
2. Fasteners and Connecting Hardware:
 1. Bolts, nuts, washers: ASTM A307-14, hot dip galvanized steel.
 2. Connectors, anchors, screws, brackets, spikes: hot dip galvanized structural quality steel.
3. Screws: to CSA B35.4-1972, zinc, cadmium or chrome plated purpose-made for specific substrates to be joined, Robertson head. In exterior wall assemblies, use deck screws with integral anti-corrosion coatings.
4. Expansion Bolts: 12mm diameter unless indicated otherwise, c/w nuts and washers.
5. Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead plugs, recommended for purpose by manufacturer, standard for quality, Hilti.
6. Wood Adhesive: PL Premium gun-grade by Lepage. No substitution.
7. Threaded Rod: Mild Steel, pre-finished rod c/w washers and double nuts to ASTM A307-14.

2.4. Finishes

1. Galvanizing: to CAN/CSA-G164-M92 (R2013), use galvanized fasteners for work to building enclosure assemblies.
2. Bituminous back-paint for surfaces in contact with concrete or masonry.

3. EXECUTION

3.1. Preparation

1. Treat surfaces of material with bituminous back-paint where applied to concrete or masonry, before installation.

3.2. Execution of Rough Carpentry

1. Provide all modifications to existing building openings and wood furring support to other elements as shown on drawings and as necessary for the work.
2. Reinforce door and window frame openings with minimum 38 thick lumber from floor to adjacent structure within steel stud walls, unless members are to 055000, to allow clearances for sill, head, and jamb finishes. Do not frame openings in tight to window or door framing.
3. Provide blocking and bucks to openings to allow adjacent components to return behind frames as detailed and to stiffen all openings in interior partitions.
4. Provide backing and support for washroom accessories, including change table, whether to existing partitions or new, and whether specifically shown on drawings or not. Include all costs for this work in the Contract Price.
5. Provide backerboards to all electrical and systems of Divisions 27 and 28 unless panels or

equipment are recess mounted.

3.3. Miscellaneous

1. Install furring and blocking as required to space-out and support wall and ceiling finishes, facings, fascia, soffit, siding and other work as required. Do not install wood products within ceiling spaces used for return air plenums.
2. Align and plumb faces of furring and blocking.
3. Install rough bucks, nailers and linings to rough openings as required to provide backing for frames, fitments, screens, Owner's supplied items, window treatments, finish carpentry, millwork, accessories, and other work.
4. Ensure, in conjunction with the services and related work required by Division 1, all wood hoarding, framed protection, temporary site carpentry, temporary bracing, shoring, ladders, chutes, and other items required for the progress of the Work.
5. Provide backing within partitions and walls with 3/4" (19mm) ply for mounting of grab bars, toilet accessories, wall guards, corner guards, mirrors and all other miscellaneous specialty or finish items, whether such items are supplied by Owner, by Allowance, or by other Trade Contractors or Suppliers. Pay all costs for this work.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. The trade contractor performing the work of this Section is cautioned that in accordance with Division 1, the standard of workmanship required for all millwork in this Contract shall be to healthcare requirements as well as this specification, whichever is more stringent. Detailing of millwork and installation shall be carefully designed to minimize joints and provide easily cleanable surfaces that can adequately withstand the aggressive cleaning requirements of public facilities without degradation.
3. All staining, coating and finishing of items provided under this Section shall be performed by This Trade Contractor, in shop conditions and prior to delivery to site except when unavoidable because of onsite fitting, to the standards identified in Section 099000.

1.2. Related Requirements

- | | |
|-------------------------------|----------------------|
| 1. Selective Demolition | Section 024119 |
| 2. Metal Fabrications | Section 055000 |
| 3. Rough Carpentry | Section 061000 |
| 4. Solid Surface Fabrications | Section 066100 |
| 5. Joint Protection | Section 079000 |
| 6. Glazing to Openings | Section 088000 |
| 7. Finishes | Division 09 |
| 8. Specialties | Division 10 |
| 9. Mechanical Work | Mechanical Documents |
| 10. Electrical Work | Electrical Documents |

1.3. Submittals

1. Submit as described in Division 1:
 1. Sources of all materials, including fasteners, proposed for use in the Work.
 2. Duplicate samples of all materials, fasteners, Products, and accessories proposed for the Work, including finishes.
 3. Detailed shop drawings for woodwork showing proposed assembly, connections, anchorage, materials, dimensions, thickness and finishes. Indicate all materials, thicknesses, finishes and hardware. Shop drawings shall be originated and produced by fabricator and may not be copied or reproduced from Consultant's drawings. Each item shall be shown in plan, section and elevation, detailed in appropriate scale, clearly displaying all required information. Single line diagrams are not acceptable. Upon request of Consultant, details showing proposed connections for all framing connections exposed in the Work.
 4. Detailed fastener and hardware list. Indicate specified hardware, including make, model, material, function, finish and other pertinent information.

1.4. Reference Standards and Codes

1. Ontario Building Code, in its latest Edition.
2. ANSI/DHI A115.IG.94 Installation Guide for Doors and Hardware
3. AWMAC Architectural Woodwork Standards Manual (Edition 2).
4. National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber, latest edition.
5. National Hardwood Lumber Association (NHLA) Rules for the Measurement and Inspection of

Hardwood and Cypress, January 1986.

1.5. Basic Product Requirements

1. Quality Control

1. Work of this Section shall be undertaken by finish carpenters able to demonstrate applicable experience to the satisfaction of the Consultant and the Owner.
2. Carpenters shall be experienced in the installation of casework for public buildings and post-secondary education projects, and shall be experienced in methods of splining, scribing, revealing, and blind fastening (French cleat and other similar methods).
3. Unless otherwise specified, carry out finish carpentry work in accordance with requirements of "Architectural Woodwork Standards Manual" (2nd Edition) of Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Premium Grade. Additionally, provide architectural millwork and woodwork so as to promote and support standards of hygiene and to withstand the cleaning practices of a modern public environments without damage or deterioration to surfaces and materials.
4. The intent of this Contract is to match detailing and finishes of all millwork with sills and other laminated finish items wherever possible.

2. Delivery, Storage, and Handling

1. Deliver, handle, and store fabricated components to prevent permanent distortion, and damage.

1.6. Basic Execution Requirements

1. Protection during Delivery and Handling

1. Cover finished wood surfaces exposed in the final work with a plastic cover before shipping to job site to protect materials against dampness during and after delivery.
2. Store materials in ventilated areas, protected from extreme changes of temperature or humidity.
3. Leave protective covering in place until final cleaning of building or until directed by Consultant to remove. Provide instructions for removal of plastic covering.
4. Protect cabinetwork against damage, including damage by excessive changes in moisture content. Maintain minimum storage temperature of 16°C, and relative humidity 25% to 55%. Do not deliver to site until atmospheric conditions within the building stabilize to the conditions likely to be encountered during the service life of the cabinetry.
5. In addition to the above requirement, the Millwork Trade Contractor and Contractor are cautioned that a condition of this Contract is that all items likely to off-gas shall be delivered to the site at least three weeks prior to Owner occupancy of the Work.

1.7. Warranty

1. At no cost to Owner the Contractor and the Trade Contractor performing the work of this Section shall remedy any defects in work of this Section due to defects in materials and workmanship, including but not necessarily limited to delamination, warping, and other defects detrimental to appearance and/or performance for a period of three (3) years from date of Substantial Performance in accordance with GC12.3.1 and 12.3.4 except as amended here. It is a given that work fabricated and installed in this Contract will undergo extensive and aggressive cleaning, as a condition of service. This shall not void any warranty.

1.8. Maintenance Manuals and Materials

1. Submit as described in Division 1:

1. Maintenance Data:

1. Brief maintenance staff regarding proper care, cleaning, and general maintenance of architectural woodwork.

1.9. Indoor Air Quality Requirements

1. Requirements for VOC and other characteristics for Products and materials specified in this Section are additionally specified in Section 018080, Indoor Air Quality. Products must conform to these requirements and as follows:

| 1. Product | VOC Limit (g/L) |
|---------------|-----------------|
| Wood Adhesive | 30 |

1.10. Building Systems Requirements

1. The work described by this Section is a component of the Interior Finishes Building Systems. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.

2. PRODUCTS

2.1. Lumber Material

1. Hardwood lumber: moisture content 8% or less in accordance with following standards:
 1. Premium or clear grade, NHLA graded kiln-dried hardwoods and softwoods, selected for straightness, without knots.
 2. Species: poplar, capable of accepting paint to Consultant's selection.

2.2. Panel and Solid Surface Material

1. Birch veneer ply for all shelves within units and elsewhere where indicated: top quality solid veneer "Russian" or "Baltic" ply birch veneer, with minor "eye" repairs only to exterior veneer, void-free through sectional cuts, capable of sustaining finishes to edges without hardwood edge-banding where so detailed.
2. Canadian softwood plywood (CSP): to CSA O151-09 (R2014), standard construction.
3. Hardwood plywood: to CSA O115-M1982 (R2001), good two sides solid veneer ply, species of finish surface as indicated.
4. Poplar plywood: to CSA O153-13 standard construction, not to be exposed in the finished work.
5. Interior mat-formed wood particleboard: to CAN3-O188.1.
6. Melamine coated Particleboard: ANSI A208.1, minimum density of 700 kg/m³. Low VOC, Uniboard, or equivalent by Panolam or Flakeboard, when used in fabrication of millwork colour is white, otherwise, colour to Consultant selection.
7. Hardboard: to CAN/CGSB-11.3.
8. Medium density fibreboard (MDF): to ANSI A208.2-2009, density 769 kg/m³.

9. Solid surface material (plastic solid surface): homogeneous composite of natural minerals and prime acrylic polymer: in accordance with Section 066100, colours selected by Consultant; unless otherwise indicated 1/2" (13mm) thick with doubled leading edge thickness.
10. Hardwood edging to veneer panel material and for edges where detailed for hardwood: soft maple species hardwood for stain finish, minimum 1/8" (3mm) thickness.
11. PVC edging for melamine and plastic laminate edges to doors, gables, casework, drawer fronts and similar, 3 mm purpose-made pvc edge to match adjacent exposed surface melamine or plastic laminate colour.

2.3. Laminates

1. GP-S and PF-S plastic laminate facing sheet with BK grade backing sheet, core, and core sealer, by Arborite and Wilsonart, as indicated on millwork drawings and in the Schedule of Interior Finishes following Division 09 in this specification. Colours, gloss and texture as selected by Consultant from full range of products. Refer to detailed finishes list for product choices. Use post-form grade to fabricate shaped surfaces where indicated. Fabrication of shaped wrapped laminated particle material shall be by dedicated countertop fabricator. ANSI/NEMA LD3-2005 Grades HGS, VGS, HGP.
2. Solid Surface Material. In accordance with Section 066100.
3. Core sealer: clear water resistant synthetic resin type.

2.4. Accessories

1. Nails, staples, screws: as reviewed and accepted by Consultant for particular installation application for concealed fastening only. Screws Robertson head.
2. Splines and concealed lamello or biscuits: hardwood species
3. Adhesive for Field Work (except to laminate applications): gun-grade PL Premium by Lepage. No substitution.
4. Adhesive for Cabinet assembly: waterproof and to acceptance of Consultant.
5. Adhesive for plastic laminates and solid surface materials: to written recommendations of finish surface manufacturer for the specific condition of service and substrate involved.
6. Silicone: pure silicone gun-grade by GE, Dow Corning or equivalent to Section 079000. Use food grade only.
7. Adhesive Tapes: Tesa 51970. No substitute.
8. Aluminium Reglets: clear anodized finish, sized in accordance with drawings, aluminium channel reglets, 1.5 mm material thickness.
9. Steel support legs shall be fabricated from architectural quality steel tube in accordance with quality requirements of Section 057000 and shall be chrome finished after fabrication. Alternatively, provide purpose-made chromed support legs to acceptance of Consultant.
10. Steel angles and supports, where detailed for support or reinforcement of millwork units, shall be fabricated from architectural quality steel sections (angles, channels, etc.) in accordance with quality requirements outlined in Section 057000.
11. All casework involving light fixtures or electrical devices shall be shop-fabricated for such devices and all devices shall be shop installed wherever possible. Onsite installation shall not include cutting and patching. Make all allowances for devices with shop construction. Onsite installation shall be restricted to devices and wiring only.

2.5. Millwork Required for this Contract

1. Millwork for this contract consists of a new fabricated casework constructed in accordance with this specification.
2. Provide millwork to all areas where identified in drawings, and to this specification section, in conjunction with the work of Section 066100 for solid surfaces and Section 062000 for finish carpentry. Inspect all drawings and this Section, and include all work.

2.6. Millwork Hardware

1. Millwork hardware is not supplied under any Material Supply Allowance or other Allowance. It is required by the Contract and shall be furnished without payment from any allowance.
2. Cabinet Hardware: Products listed below are a standard of acceptance. Products by other manufacturers, of equal quality and similar appearance may also be provided subject to review and acceptance by Consultant.
 1. Hinges for 3/4" doors: Blum 91 650, 170 deg with self-closing spring. 105 degree minimum, each door equipped with one soft-closer
 2. Hinges for 1 3/8" doors: Hager 1279, 75 x 75 mm.
 3. Glass door hinges: Hafele 361.49.201.
 4. Glass door locks: Hafele 233.09.621.
 5. Glass shelf supporting rods: Hafele 283.37.200.
 6. Door and drawer pulls: brushed chrome D pull by Richelieu or equivalent. For Doors to Uppers that are greater than 3'-0" in height: contemporary steel pull no.305, brushed chrome, 24" and 28" long.
 7. Recessed door pulls: 101.79.904 nickel plated matt by Hafele.
 8. Drawer slides: full extension for minimum 45kg (100lbs) load at 20", by K & V or Accuride, unless drawer is prefabricated similar to Metabox by Blum.
 9. Drawer locks: Olympus 078 or National Cabinet Lock C8702 or Corbin CCL 02066, keyed as directed by Consultant.
 10. Cabinet locks: Olympus 078 or National Cabinet Lock C8702 or Corbin CCL 02067, keyed as directed by Consultant.
 11. Push latch: automatic open, magnetic or mechanical by Hafele or Richelieu.
 12. Automatic door bolt for double doors: Hafele 245.58.754.
 13. Flat bolt: 373180 by Richelieu.
 14. Reversible secret latch: 600100 by Richelieu.
 15. Door locks for 1 3/8" doors: supplied by Section 087000.
 16. Cable grommets: plastic countertop fitting for computer / telephone / power cables: 2-part cable set with spring closure top, 60mm diameter: by Hafele; colour to Consultant selection to suit countertop finishes. Multiple colours may be selected.
 17. Support legs and post: adjustable, 60mm diameter with welded mounting plate; finish colour to Consultant selection; by Hafele or Richelieu.
 18. Label holders: 95mm x 55mm (with label window 75mm x 35mm), nickel plated steel, by Hafele or Richelieu complete all round head metal pins.
 19. Garbage/Recycling Unit: Richelieu #3642100 or equivalent, Tandem Triple bottom-mounting, silver grey c/w one 18L and two 8.5L bins.
 20. Door Bumpers: 3x10mm clear soft Self-Adhesive Richelieu #MP30311.
 21. Magnetic Catches: Heavy-duty, Richelieu #BP30010.
3. Hardware finish: Unless otherwise indicated chrome or brushed chrome.

2.7. Fabrication of Millwork

1. Framing: minimum 3/4" (19mm) full veneer plywood, minimum 2 1/2" (65mm) wide.
2. Case bodies:
 1. Gables minimum 3/4" (19mm) melamine Uniboard Dolomite or equivalent, with pvc

- leading edge to all case body fronts exposed in the Work. Exposed side gables and casework bottoms shall receive plastic laminate finish with PVC edge-banding.
2. Provide full backs, minimum 1/2" (13mm) melamine particle core similar.
 3. Shelving 3/4" (19mm) full veneer Baltic core ply only, leading edge exposed and with slight sanded profile edges. Final fabricated shelves shall be stained and finished with two coats water-borne low lustre clear protective finish.
 4. Glass shelves shall be min 10 mm (3/8") tempered glass with polished edges. Supports for glass shelves shall be designed and provided for safety retention and positive attachment.
 5. All shelves shall be to several adjustable positions. Drill holes. Do not use recessed metal shelf support systems.
 6. Where interior of casework is exposed to view (when doors are in the open position), all exposed surfaces shall be plastic laminate.
3. Drawer systems:
1. Blum Metabox or equivalent by Hefele where located in staff lunchroom. Otherwise full melamine particle core heavy duty construction with full extension glides.
 2. 13mm melamine Uniboard or equivalent.
 3. Fronts plastic laminate on particle core. Edge band with pvc.
4. Casework Doors and drawer fronts: plastic laminate each side on particle core with 3mm pvc edging, and backer sheet finish to interior.
5. Hardware pulls as required to door and drawer fronts, to this specification, or to match existing adjacent millwork where necessary to complete alterations to existing casework.
6. Countertop 1 1/2" (38mm) particle core with plastic laminate and backer sheet to bottom surface, 180 degree furniture bullnose front edge and plastic laminate to all exposed gable ends. Backsplash shall be 4" (100mm) high post formed. Where counters are curved, provide plastic laminate leading edge in lieu of 180 degree bullnose edge.

3. EXECUTION

3.1. Shop Fabrication

1. Use blind methods of fastening only. Do not use nails and countersink screws.
2. Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

3.2. Site Installation

1. Install architectural woodwork to Premium Grade Quality Standards of AWMAC Architectural Woodwork Standards Manual, except where specified otherwise.
2. Install millwork at locations shown on drawings and to detail and in strict accordance with accepted shop drawings.
3. Position accurately, level, plumb straight.
4. Installations with exposed fasteners to exterior surfaces of the work will be rejected.
5. Fasten and anchor millwork securely. Provide heavy duty fixture attachments for wall mounted cabinets and change grooming stations and vanities.
6. 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.

7. At junction of counter or backsplash and adjacent wall finish, apply small bead of sealant. Install backsplash in full bed of sealant.

3.3. Schedule of Woodwork Items (See also Section 066100 for Solid Surface Work)

1. Provide all work for new woodwork shown on drawings, as required to complete installation. See A700 Series drawings, and all architectural drawings.
2. The work of this trade contractor shall include all work for integral and provision of solid surface fabrications as described in Section 066100.
3. The work of this trade contractor shall include all exposed support legs to counters, chrome finished, and all detailing of counters for continuous hinged electrical and communications chase to below counters, complete with specified electrical insert for wiring by the Electrical Trade Contractor.
4. Provide standing and running trim for paint finish wherever indicated on drawings, using poplar grade species.

3.4. Cleaning and Protection

1. Clean all casework completely inside and out.
2. Protect all architectural woodwork from damage until final acceptance.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Provide solid polymer counters and vertical panels, as detailed on the drawings.
3. The work of this Section must be performed by a trade contractor working under the Architectural Woodwork or Finish Carpentry Trade Contractor, in direct co-ordination from initial shop drawing stage to the handover of the finished Work.
4. The Work of this Section is subject to Alternative Pricing, to provide post-formed plastic laminate countertops in lieu of solid surface counters to all millwork units except reception counters. Inspect the bid forms and provide all required Alternative Pricing to the bidding contractor. The bidding contractor shall provide all Alternative Pricing items to the Owner in the completed bid forms.

1.2. Related Requirements

- | | |
|---|--------------------------|
| 1. Metal Fabrications | Section 055000 |
| 2. Rough Carpentry | Section 061000 |
| 3. Architectural Woodwork | Section 064000 |
| 4. Joint Protection | Section 079000 |
| 5. Glazing to Openings | Section 088000 |
| 6. Interior Finishes System General Work Requirements | Section 090500 |
| 7. Non-Loadbearing studs and Boardwork | Section 092000 |
| 8. Installation of Owner Supplied Equipment | Section 110500 |
| 9. Mechanical | See Mechanical Documents |
| 10. Electrical | See Electrical Documents |

1.3. Submittals

1. Submit as described in Division 1:
 1. Sources of all materials, including fasteners, proposed for use in the Work.
 2. Duplicate samples of all materials, fasteners, Products, and accessories proposed for the Work, including finishes. Countertop samples must include all counter edge profiles. Submit samples of solid surfacing materials to the Consultant for colour selection. The materials used in the building shall correspond to the approved samples.
 3. Submit Shop Drawings:
 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, edge details, and other components.
 2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement required.
 3. Show locations and sizes of cutouts and holes for plumbing fixtures and trim washrooms accessories, and other items installed in solid surface.

1.4. Protection

1. Refer to General Instructions Section 011010.
2. Countertop surfaces shall be covered with heavy kraft paper, or tops shall be put in cartons for

protection during shipment.

3. Protect installed countertop with heavy kraft paper secured in position with masking tape. Do not remove until final inspection.
4. Comply with the printed directions, issued by solid surface Manufacturer.

1.5. Warranty

1. Solid surface countertops and all other solid surface fabrication work shall be warranted by the Contractor and the Trade Contractor performing the work of this Section against warpage or manufacturing defects for a period of ten (10) years from the date of Substantial Performance of the Work. Work showing defects during this period shall be replaced or made good without delay and at no expense to the Owner, in accordance with GC12.3.1 and 12.3.4 as amended and for this period.

1.6. Maintenance Data and Materials:

1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.
2. Provide maintenance kit for finishes.

1.7. Building Systems Requirements

1. The work described by this Section is a component of the Barrier-free Path of Travel System and the Interior Finishes Building System. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.

2. PRODUCTS

2.1. Materials

1. Solid surfacing material shall be cast, nonporous, filled polymer, with through body colours, Greenguard certified; Everform as manufactured by Formica, or equivalent by Dupont, Wilsonart, Samsung Staron, or Avonite and meeting the design and performance requirements as outlined herein and in the Documents.
 1. Thickness: 1/2" (13mm)
 2. Finish: Semi-gloss
 3. Edge: as detailed
 4. Flammability: Flame Spread Index 0 and Smoke Development Index 5, when tested to CAN/ULC-S102.
 5. Class A to NFPA 101, Life Safety Code
 6. Fungi and Bacteria: Does not support microbial growth as per ASTM G21 & G22
 7. Microbial Resistance: Highly resistant to mould growth as per UL 2824
 8. Colours to match as follows:
 1. Solid Surface Type 1 (SSM-1), no.758 "Bianco Mineral"
 2. Solid Surface Type 2 (SSM-2), no.601 "Bleached Concrete"
 3. Splashes: to match the countertop colour.
2. Joint adhesive: Manufacturer's standard one or two-part adhesive kit to create inconspicuous, nonporous joints.
3. Sealant: Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant, ULC or cUL listed silicone sealant in colours matching components.

4. Conductive tape: Manufacturer's standard aluminium foil tape, with required thickness, for use with cutouts near heat sources.
5. Insulating felt tape: Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat sources.
6. Chromed counter legs shall be purpose-made from hollow steel tube, complete with flange for underside of counters and bottom insert to full bottom surface (black colour). All support legs shall be provided by the Trade Contractor performing the work of this Section.

2.2. Shop Assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with accepted shop drawings and manufacturer's printed instructions and technical bulletins. Provide products in the largest pieces available and minimize joint-work. Locate joints to surfaces out of primary view wherever possible. Match pattern in materials across joints that continue in the same plane.
2. Form joints between components using manufacturer's standard joint welding adhesive without conspicuous joints. Reinforce with continuously welded strip of solid polymer material, 50mm wide.
3. Provide factory cutouts for plumbing fittings and accessories as indicated on the drawings and as necessary for co-ordination and completion of the Work. This includes for all grommets, inserts for electrical and datacom devices, holing for mechanical ventilation, and preparation for fastening. Form smooth rounded edges and polish all holing where exposed in the finished work or for removable inserts.
4. Rout and finish component edges with clean, sharp returns.
5. Rout cutouts, radii and contours to template.
6. Smooth and polish all edges.
7. Co-ordinate ALL layout and thicknesses with Sections 062000 and 064000 for 3/4" (19mm) plywood substrate to solid surfaces. Where leading edges are 1/2" (13mm) thickness, then casework fronts provided by 064000 shall obscure leading edges of plywood underlay.
8. Leading edges: Provide leading edges as detailed and:
 1. Fabricate all integral leading edge solid surface material of reception desks and where detailed to produce 1-1/2" (38mm) finished thickness with bevel leading edge profile, typical to all edges of the installation. Method of fabrication of leading edges shall be heavy-duty surface-to-surface construction.
 2. Leading edge of solid surface material other than item 1 above shall be same thickness as the countertop, 1/2" (13mm) finishes thickness with bevelled profile, at all edges of the installations.
9. Splashes: provide back and side splashes wheresoever detailed, minimum 4" (100mm) in height, and to greater heights where indicated on drawings.

3. EXECUTION

3.1. Examination of Surfaces and Conditions

1. Refer to Division 1 requirements and General Instructions for responsibilities to sample the

progress and quality of the work upon which the work of this Section depends. Commencement of work of this Section shall be deemed acceptance of conditions and hence forward all defects in existing conditions whether existing prior to this Contract or as created by the progress of the Work, as affecting the quality of the work of this Section, shall be rectified by the further work of this Section.

2. Surface and ambient temperatures shall be minimum of 20°C at a relative humidity between 20% to 80%, for a minimum of 72 (seventy-two) hours prior to installation and continually following installation.

3.2. Installation – General

1. Install work plumb, true and square, neatly scribed to adjoining surfaces.
2. Make allowances around periphery and where fixed objects pass through or project into countertops to permit normal movement without restriction.
3. Form field joints using manufacturer's recommended welding adhesive, with joints inconspicuous in finished Work. Exposed joints/seams visible from beyond 900 mm shall not be allowed.
4. Reinforce field joints with solid surface strips extending a minimum of 50mm on either side of the seam with the strip being the same thickness as the top.
5. Field cut and finish component edges with clean, sharp returns to achieve shop quality workmanship.
6. Rout radii and contours to template only where necessary to suit tolerances and small field conditions. Cutting of pieces for length or to rectify mistaken fabrication shall be performed in the shop.
7. Anchor countertops and fascia securely to base cabinets or other supports, using concealed permanent fastening methods only.
8. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in colour to match countertop and matching pattern in surfaces that continue in same plane across the joint.
9. Install vertical panels as indicated, anchored securely to casework and columns, as applicable. Fabricate supporting structures and provide all work for such supporting structures in co-ordination with architectural woodwork and finish carpentry trade contractors and to standards of those Sections.
10. Carefully dress joints smooth, remove surface scratches and clean entire surface.
11. Install countertops with no more than 3 mm sag, bow or other variation from a straight line.
12. At junction of counter back and side panels to adjacent wall finishes, apply small bead of sealant.
13. Upon completion of installation remove identification marks and clean all surfaces. Protect as specified above.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|--|----------------------|
| 1. Fire Separation Systems | Section 019522 |
| 2. Metal Fabrications | Section 055000 |
| 3. Rough Carpentry | Section 061000 |
| 4. Joint Protection | Section 079000 |
| 5. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 6. Acoustical Ceiling Tile Systems | Section 095100 |
| 7. Mechanical Work | see Mechanical Docs. |
| 8. Electrical Work | see Electrical Docs. |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Complete product data and written applications with standard detail drawings and test certification for specific fire-stop situations for this project. This submission must be from the system manufacturer, using accepted test results for all situations encountered in the work, and submitting engineer's opinion proposals for all conditions not specifically covered by a manufacturer's test. Submit to both Consultant and Building Department for review and acceptance prior to performing work of this Section.

1.4. Reference Standards and Codes

1. CAN4-S115-M85, Standard Method of Fire Tests of Firestop Systems.
2. ULC tests for fire-stopping systems in the latest edition.

1.5. Basic Product and Execution Requirements for This Contract

1. All work must be performed to meet ULC & Building Code requirements, and to achieve an equivalent level of protection as the separation or protective membrane penetrated. Additionally, fire-stopping must achieve a minimum fire protection rating for fire separations and fire resistance ratings for 2 and 1 hour separations as applicable, and fire protection ratings of 1.5 hour and 45 minute within protected openings as applicable. In this section, the term "fire separation" shall be deemed to include separations, fire-resistive membranes and assemblies, fire walls, rated closures to openings in such elements, and protective membranes whether assigned a time of resistance or not.
2. This Contract includes the provision of new fire-stopping to penetrations of new system components to both existing and new fire separations, and ALL fire separations wherever identified in the Documents.

1.6. Quality Control

1. All sealant work shall be performed by a single fire-stop trade contractor using application tools and equipment to sealant manufacturer's written acceptance, and with skilled forces having a minimum of three years direct experience in the employ of the sealant trade or similar sealant application trade contractor. The only exception to this qualification requirement shall be by written acceptance of the Owner and commensurate reduction in Contract Price to cover the cost of independent inspection.

1.7. Warranties

1. All warranties shall be provided in accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended.

1.8. Identification of Building Systems

1. The work described by this Section forms components in the Fire Separation System as described in Section 019522, and as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010.

2. PRODUCTS

2.1. Materials

1. Fire stopping and smoke seal systems in accordance with CAN4-S115:
 1. Hilti FS-1, with full written submission by manufacturer's representative for all conditions in the Work.
 2. 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. Stone wool by Rockwool shall form the standard, with densities to suit application. For steel deck flutes ensure purpose-made shaped closures in coordination with deck supplier.
 3. Equivalent manufacturers and their systems shall only be considered by submission to the Consultant during the Bid period.
 4. All fire-stopping throughout the Work must be of same manufacture and shall be coordinated by the Contractor for one submittal.

3. EXECUTION

3.1. Preparation

1. Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
2. Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
3. Maintain insulation around pipes and ducts penetrating fire separation.
4. Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2. Installation

1. Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.
2. 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.

3. Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
4. Tool or trowel exposed surfaces to a neat finish.
5. Remove excess compound promptly as work progresses and upon completion.

3.3. Acceptance

1. Notify Consultant when ready for review and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4. Schedule of Locations and Installations

1. Fire-stop and smoke seal at:
 1. All fire separations in the work.
 2. Penetrations through fire-resistance rated and smoke sealed (0 hr. fire separations) partitions and walls.
 3. Top of fire-resistance rated masonry and gypsum board partitions.
 4. Openings and sleeves installed for future use through fire separations.
 5. Around mechanical and electrical assemblies penetrating fire separations. Coordinate installation with clearance requirements at fire dampers.
 6. Rigid ducts: greater than 129 cm²: 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 separation. Co-ordinate installation with clearance requirements at fire dampers.
 7. At underside steel deck, at roof assembly, and at wall assembly, to all fire separations, provide backup material and fire stopping to Hilti-recommended details and related ULC Test Designs.

3.5. Clean Up

1. Remove excess materials and debris and clean adjacent surfaces immediately after application.
2. Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. All sealant work shall be performed by a dedicated sealant trade contractor with minimum three years experience in similar work, using skilled and trained forces. All sealant work is subject to mock-ups and participation in Pre-installation conferences for the Environmental Separation Systems.
3. Perform all work to meet requirements of Section 070500 Environmental Separation System.

1.2. Related Requirements

1. Contractor shall thoroughly review the requirements described in all Divisions of the specification, and this Section, to ensure that all sealant, caulking, and joint filler work required for the completed Work is assigned and included for best sequencing of construction and best performance by qualified personnel engaged in aspects of the Work. The Work includes multiple mobilization and installation by specialized forces fully skilled in the application of sealants as a designated sealant trade contractor or mechanic.
2. To All Divisions of the Specification: this section is intended to govern all joint protection and sealant work in the Contract, excepting only specialized sealant work within manufactured Products and Curtainwall systems.

3. Refer also to the following Sections (not a complete list)

| | |
|-----------------------------------|----------------------|
| Architectural Woodwork | Section 064000 |
| Solid Surface Fabrications | Section 066100 |
| Fire and Smoke Protection Systems | Section 078400 |
| Interior Finishes | Division 09 |
| Specialties | Division 10 |
| Plumbing Fixtures | see Mechanical Docs. |

1.3. Submittals

1. Submit in accordance with Division 1:
 1. Product cuts of all Products proposed for use, as a single submittal from the manufacturer's representative for the complete range of sealant products.
 2. Samples of each type of material and colour as it will appear in the finished Work, mocked up to small portions of the work at beginning of operations for each type of sealing work and joint filling.
 3. Submit qualifications of all sealant applicators upon request of Consultant.
 4. Provide all mockups and sample installations in conjunction with enclosure and finish mockups. Mockups and sample installations do not form part of the finished Work.

1.4. Co-ordination

1. This Section specifies caulking work and sealants that may also be described in other Sections.

2. Refer to other sections for other caulking and sealant work and co-ordinate with work described therein. Work of other sections may specify other sealant products. The most stringent requirement shall govern, subject to selection of sealant products consistently throughout the Work.
3. Sealants must be applied as an integral part of building in items within the Work, so that sealing planes are clean and proper. Schedule portions of sealant work in strict co-ordination with partial assembly of systems for best seal and concealed applications wherever possible, and in accordance with agreed sequences as established by mockup and co-ordination meetings. The contract requires multiple mobilizations for sealants and caulking work to suit the environmental separation system assembly sequence. Further mobilizations are required to achieve performance of the interior finish system and all installations of fabricated items, millwork, and similar.

1.5. Quality Control

1. All sealant work shall be performed by a single, experienced sealant trade contractor using application tools and equipment to sealant manufacturer's written acceptance, and with skilled forces having a minimum of three years direct experience in the employ of the sealant trade or similar sealant application trade contractor. The only exception to this qualification requirement shall be by written acceptance of the Owner and commensurate reduction in Contract Price to cover the cost of independent inspection.
2. Sealant work performed by "own forces" is not acceptable.

1.6. Warranties

1. Warranty in accordance with Division 01 requirements, and: =
 1. Sealant Trade Contractor shall directly warrant to the Owner that all sealant work installed at any location in the Environmental Separation System in accordance with GC 12.3.1 and 12.3.4, but as amended by this Section for a period of 3 (three) years following Substantial Performance of the Work.

1.7. Indoor Air Quality Requirements

1. Requirements for VOC and other characteristics for Products and materials specified in this Section are additionally specified in Section 018080, Indoor Air Quality. Products must conform to these requirements and as follows:

| Sealants | VOC Limit (g/L) |
|----------------------------------|------------------------|
| Architectural Sealant | 250 |
| Non-membrane Roof Sealant | 300 |
| Roadway Sealant | 250 |
| Single-Ply Roof Membrane Sealant | 450 |
| Other Sealant | 420 |

| Sealant Primers | VOC Limit (g/L) |
|--|------------------------|
| Architectural, Non-Porous Sealant Primer | 250 |
| Architectural, Porous Sealant Primer | 775 |
| Modified Bituminous Sealant Primer | 500 |
| Other Sealant Primer | 750 |

1.8. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the

system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:

1. Environmental Separation System, to provide components of that system, as described in Section 070500;
2. Interior Finishes System, to provide components of that system; and
3. Exterior Finishes System, to provide components of that system

2. PRODUCTS

2.1. Sealant Materials:

1. General Standard of Use within Environmental Separation System assemblies: one part low modulus silicone, Dow Corning DOWSIL 790; or accepted equivalent by Tremco. Contractor to review and select sealants based upon specific conditions, from one manufacturer, using manufacturer's written input as to selection. Only top line construction sealants shall be used. MONO or other consumer products are not acceptable. Where acrylic-based products are proposed for interior use, review and acceptance of Product by Consultant is required together with credit to Contract Price. All colour selections are by Owner from full colour range availability. There are multiple colour requirements in the Work.
2. Butyl to CGSB 19-GP-14M in conjunction with butyl tape use described elsewhere
3. To interior concrete slab sawcut joints, and to complete perimeter of slabs at penetrations: Loadflex by Sika as specified in Section 033000 and herein.
4. Against masonry and concrete: select Sealant product for compatibility with lime rich mortars and ph of concrete.
5. Preformed Compressible and Non-Compressible Back-up Materials: As recommended by sealant manufacturer for best configuration and performance of finished joint for particular material adjacencies. All sealant work requires compressed backup material unless specifically accepted otherwise by the Consultant in each instance.
6. Bond Breaker Tape: polyethylene bond breaker tape that will not bond to sealant.
7. Joint Cleaners: Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.
8. Primer: as recommended by manufacturer of sealant.
9. Sealants to millwork and counters, plumbing fixtures and similar shall be food-grade approved, mildew resistant pure silicone by GE or Dow-Corning. Multiple colours to be selected.
10. Fire-stop sealants shall be as described in Section 078400.
11. Roofing sealants shall be as described in the specification sections for roof systems.
12. Sealants within glazed areas and interior to manufactured window products shall be in accordance with manufacturer of curtainwall, door, entry, or similar system, to achieve watertightness and air tightness performance of the product. All sealants to perimeter of such systems and product installations shall be in accordance with this section 079000.
13. Sealants used in joint protection work where one side of joint is PVC or TPO surface shall not be bitumen-based and shall be specially formulated for exterior use with PVC or TPO materials.

3. EXECUTION

3.1. Sequencing and Intent

1. Schedule sealing and caulking work at time of build-in of construction items and components. Application of sealants is dependent upon the agreed construction sequence for the overall assembly, and is subject to mockup provisions and multiple mobilization requirements without increase in the Contract Price or Contract Time.
2. Sealant work shall be supplied and installed to complete the Rainscreen primary water control subsystem of the Environmental Separation System, and in all cases shall be installed so that the rainscreen design is maintained with drainage to the exterior at the base of all cavities, including at base of cavity above openings.
3. Sealant work shall be supplied and installed to locations indicated at the lines of Weather Barrier control systems for vapour and air, as a secondary system of control to jointwork and connections between components of the assemblies. Joint sealants shall not form the primary barrier. The primary barrier is established completely by the products and work described in Section 072500, with joint protection as supplementary.
4. Sealant work to the interior and exterior forms part of the Interior Finish System and the Exterior Finish System, and shall be selected and installed for finish and colour, for further paint finish where required, to form smooth and flush surfaces. Installation of sealants as formed corner caulking without backer rod to the joint is not acceptable in any location in the Environmental Separation System assemblies.
5. The Contractor and this Trade Contractor shall review all sequencing and all detailing to ensure that joints have adequate width for installation of backer rod and sealant. Report any installations during the course of the work that do not conform, so the Consultant can identify required remedial measures to be taken by the trades installing the components adjacent the joint. Sealant application as corner bead between adjacent surfaces at right angles to one another is not acceptable. Co-ordinate the Work so that all joints have adequate sizing for installation of backer rod and flush struck joints of width and depth within sealant manufacturer recommended tolerance.
6. It is the intent that sealants within glazed curtainwall and window areas are supplied and installed by the glazing and openings trade. All jointwork at perimeter of these elements shall not be provided by the window trade, but by this Section.
7. Sealant work at roofing assemblies and to walls and parapets at roof shall be performed to the standards of this Section, by the Roofing Trade Contractor. Ensure that Products are fully compatible with adjacent materials at perimeter of roof, including for roofing work to existing portions of the building and for further areas by accepted Provisional Prices.

3.2. Protection

1. Protect installed work of other trades from staining or contamination.

3.3. Preparation of Joint Surfaces

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 that 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.

3.4. Priming

1. Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
2. Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.5. 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 and to form consistent profile for back of joint filler.
3. All joints require backer rod. Corner beaded coved sealant applications are not acceptable. Review the drawing details carefully and ensure adjacent surfaces and Products have been installed so as to leave sufficient gap for backer rod and flush struck jointing.

3.6. Application of Sealant

1. Schedule sealant work to occupied spaces for minimal exposure of the public to curing process, and well prior to handover of the work. Sealant work must be complete prior to commencement of building flush-out requirements as set out in Division 1.
2. Apply sealant in accordance with manufacturer's written instructions.
3. Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
4. Apply sealant in continuous beads.
5. Apply sealant using gun with proper size nozzle.
6. Use sufficient pressure to fill voids and joints solid.
7. Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
8. Tool exposed surfaces before skinning begins to give slightly concave shape.
9. Remove excess compound promptly as work progresses and upon completion.

3.7. Curing of Sealant

1. Cure sealants in accordance with sealant manufacturer's instructions.
2. Do not cover sealants until proper curing has taken place.

3.8. Cleanup

1. Clean adjacent surfaces immediately and leave work neat and clean. Remove excess and droppings, using recommended cleaners as work progresses. Remove masking tape after initial set of sealant.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. For doors and frames in Environmental Separation System locations, perform all work to requirements of Section 070500. For doors and frames within building interior, perform all work to requirements of Section 090500.
3. The Contractor and Trade supplier are cautioned that the work of this Section includes the provision of all glazing and door hardware, excepting only the door hardware noted for Cash Allowance provision in Section 087100, auto door operators, locksets, strike plates, and electric strikes for hinged doors. All other hardware to doors and frames described by this Section shall be provided by the Steel Door and Frame Trade Contractor. All shop prep of doors and frames for auto door operators, locksets, strike plates, and electric strikes shall be provided by the Steel Door and Frame Trade Contractor to suit the specific hardware that will be provided by other Trade Contractor.

1.2. Related Requirements

- | | |
|---|----------------|
| 1. Emergency Egress System | Section 019521 |
| 2. Fire Separation System | Section 019522 |
| 3. Barrier-Free Path of Travel System | Section 019530 |
| 4. Metal Fabrications | Section 055000 |
| 5. Rough Carpentry | Section 061000 |
| 6. Fire and Smoke Protection Systems | Section 078400 |
| 7. Joint Protection | Section 079000 |
| 8. Wood Doors | Section 081400 |
| 9. Hardware to Openings | Section 087000 |
| 10. Auto Door Operator and Related System | Section 087150 |
| 11. Glazing to Openings | Section 088000 |
| 12. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 13. Painting and Coating | Section 099000 |
| 14. Finishes | Division 09 |
| 15. HVAC Air Distribution Systems | Mech. Docs. |
| 16. Electrical | Elec. Docs. |
| 17. Communications Systems | Divisions 27 |
| 18. Electronic Safety & Security Systems General Work Requirement | Divisions 28 |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Complete detailed shop drawings of doors and hardware. Include door and frame schedules, materials and finishes, hardware preparations and frame anchorage details.

1.4. Co-ordination

1. Work Supplied but whose Installation is by Other Trade Contractor
 1. Supply frames and anchors to those performing work of other Sections where it is necessary to built frames into work of other Sections, for installation by related trades.
 2. Supply instructions to other Trade Contractors as required for accurate positioning and proper installation of components supplied to those trades.
 3. Note that drawings do not show required widths of frames to suit partition and wall

conditions and assemblies. The Supplier and the Contractor shall co-ordinate the shop drawing submission to suit all assemblies, and the Contract includes all required widths of frames to suit conditions.

2. Work Described in Other Sections Requiring Co-ordination by this Trade Contractor

1. The supplier of steel doors and frames under this Section shall co-ordinate and provide door and frame certifications and listings to meet NFPA 80, OBC, and Opening Schedule requirements for protective glazing and frames in rated protected openings. Provide the appropriate label and Listing for the frame and door to suit the ceramic protective glazing (whether UL, WH, or other accepted Listing as required to provide full compliance with protective requirements).

1.5. Reference Standards and Codes

1. Unless otherwise specified, meet the requirements of the "Canadian Manufacturing Specification for Steel Doors and Frames" and "Recommended Dimensional Standards for Commercial Steel Doors and Frames" published by The Canadian Steel Door Manufacturers' Association.
2. Fire protection requirements: fire rated doors and frames shall bear ULC or WHI label for required rating and shall be installed with NPPA 80 – Fire Doors and Windows, current edition. Provide temperature rise rated assemblies where required by the fire separation designation, and select appropriate certification and label to suit the glass dimensions shown in drawings and schedules.

1.6. Quality Control

1. Acceptable manufacturers: Member of The Canadian Steel Door Manufacturers' Association.

1.7. Basic Product Requirements

1. Tag doors and frames at shop with identification indicating proper location for installation.
2. Deliver, store and handle components so as to prevent damage, distortion and corrosion. Store components off the ground and under cover in a dry protected area. Stack doors and frames to prevent twisting. Do not enclose components in plastic covers without venting.
3. Co-ordinate frame and door height with floor finishes, and with masonry jointing, to ensure installation provides best fit and operation in each location.

1.8. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended.

1.9. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Systems Commissioner responsible for the system:
 1. Emergency Egress System, providing components, as described in Section 019521
 2. Fire Separation System, providing components, as described in Section 019522
 3. Barrier Free Path of Travel System, providing components, as described in Section 019530
 4. Environmental Separation System, providing components, as described in Section 070500
 5. Interior Finishes System, providing components of that System, as per Section 090500
 6. Security and Door Access Control Systems, as further described in Divisions 27 and 28.

2. PRODUCTS

2.1. Materials

1. Sheet Steel: hot dipped galvanized (wipe coated) cold rolled steel with stretcher level degree of flatness, meeting requirements of ASTM A924M-16 and ASTM A A653M-15e1, minimum zinc coating designation ZF120.
2. Sheet Stainless Steel for stainless door frames where indicated: S316 Stainless, 1.5 mm thick. Note that S304 stainless is not acceptable for stainless door frames.
3. Core materials:
 1. Fire rated doors: in accordance with fire test requirements.
4. Finishing materials:
 1. Touch up paint: zinc rich paint CAN/CGSB-1.181-92.
 2. Metal filler: two-component epoxy type.

2.2. Hardware Preparation

1. Obtain full hardware specifications and list, as well as templates, prior to final fabrication of doors and frames. Co-ordinate all preparation with this list and review Contract Documents for potential discrepancies. Report any discrepancies to the Consultant for instruction.
2. Prepare for cylindrical hardware, in strict co-ordination with hardware schedule, except where specified otherwise. Provide cylindrical lock preparation to ANSI A115.2, including integral latch case support.
3. Blank, reinforce, drill and tap doors and frames for concealed and mortised hardware. Reinforce doors and frames for surface mounted hardware. Provide door closer reinforcement at all steel doors and frames whether closer is required by hardware list or not. Provide exterior doors and frames to receive alarm system contact switches.
4. Prepare for routing of cabling for door access control systems and intrusion detection systems, as well as electric strikes and other interfaces with hardware, doors, and frames, so that all such cabling can be easily field installed after initial frame install.

2.3. Steel Doors

1. Construct fire rated doors in accordance with fire test requirements. Provide astragals at fire rated pairs of doors. Doors located in firewalls shall be temperature rise rated and labelled as required by regulatory requirements.
2. Join door face sheets at vertical edges by tack welding. Render joints invisible by filling, grinding and dressing smooth; mechanically locked joints are not acceptable.
3. Hardware reinforcements shall be minimum 3.4 mm thick in addition to door skin thickness. Provide continuous reinforcement at continuous hinges.
4. Surround glazed and louvered openings in flush doors with 1.2 mm thick steel edge channels, welded to both face sheets.
5. Provide removable glazing stops of zinc coated steel channels butted at corners, accurately fitted into position and fastened with oval head Philips screws.

2.4. Frames and Screens

1. Provide setup and weld frames for all frames and screens. Provide T-style centre mullions. Form glass and door stops integrally with frame; do not add as a separate profile. Ensure prep is for minimum 6 mm glass in all cases, except where glazing units are double-glazed. For double-glazed units, form integral stop such that glazing unit centres on the door or screen thickness.
2. Assemble components with accurately cut joints. Mitre outside corner joints of frames continuously. Weld joints for SUW frames on inside of profile; grind welds, flush and sand to smooth uniform surface. Tabbed and spot-welded construction is not acceptable.
3. Fit and assemble work in the shop wherever possible, eliminating field joints.
4. Glazing stops for screens shall be minimum 0.9mm thick steel, mitred at corners, drilled and secured with oval head screws.
5. Side lite and transom framing shall be of same thickness metal as adjacent door frame.
6. Drill interior door frames for rubber bumpers. Drill strike jamb of each single door frame for 3 bumpers. Drill head member of double door frames for 2 bumpers.
7. Provide angle or channel door head reinforcement for doors wider than 915 mm.
8. Tack weld two removable minimum 1.2 mm thick steel spreader channels to inside faces of door frames at base, for all set-up and welded frames.
9. Provide adjustable base clips for anchorage to floor at bottom of each door jamb.
10. Protect hardware reinforcements at frames in masonry elements with 0.9 mm guard boxes.
11. Hardware reinforcements shall be minimum 3.4mm thick exclusive of frame thickness. Provide hardware reinforcement at all hardware fastening points.
12. Fabricate frames, screens and sidelites with due attention to interior elevations. Where high bases are shown to floor height sidelites or added height to head is shown for masonry joint co-ordination provide such configurations as included in the base requirements of the Contract and Contract Price.

2.5. Finishes

1. Fill seams, corner joints and other depressions with filler and sand smooth.
2. Clean and remove all traces of oil, grease and other foreign substances to ensure proper bond of touch up after fabrication.
3. Touch up damaged zinc coating with zinc rich paint.
4. Isolate, where necessary to prevent electrolysis, metal surfaces in contact with dissimilar metals or cementitious materials.

3. EXECUTION

3.1. Installation General

1. Installation shall be by the finish carpentry trade, except set-up and welded frames, which shall be built in by the relevant wall/partition trade contractor.
2. Install labelled steel fire-rated doors, screens, and frames to NFPA 80 except where required otherwise by the Listing for the opening. The most stringent requirement shall apply, including requirements of the supplied ceramic fire-protective glazing to suit opening sizes in doors and frames.

3.2. Frame Installation

1. Allowable limit of distortion shall be 1.5 mm out of plumb at each jamb, measured on face of frame, resulting in maximum twist of frame of 3 mm measured from upper corner to lower diagonal corner.
2. Generally, anchorages of frames shall be by means of standard anchors for each jamb material condition. Where standard anchors cannot be used, provide special anchors to ensure proper installation.
3. Provide minimum 3 anchors at each jamb. At frames exceeding 2150 mm in height provide one additional anchor for each additional 610 mm, or part thereof.
4. Anchor immediate intermediate vertical frame members to structure above as required to ensure stability. Where required, provide steel frame extensions. Provide flexible connection at structure to allow for deflection.
5. Remove steel shipping spreaders to SUW frames; install wood installation spreaders at sill and at third points of frame rabbet height to maintain constant frame width. Remove wood spreaders only after frames are securely anchored in place.

3.3. Touch-up

1. Patch damaged shop galvanizing. Remove rust. Sand damaged and abraded surfaces and touch-up with zinc rich paint.

3.4. Glazing

1. Install glazing for doors in accordance with Section 088000 - Glazing.
2. Glazing stops for doors shall be painted while removed and prior to glazing. Do not under any circumstance allow finish painting of frames with stops in-situ or prior to glazing operations. Failure to comply with this requirement will mean that all stops and glazing shall be removed, all surfaces re-prepared and sanded smooth, and all stops and glazing re-installed after acceptance of paint finishes.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. For doors and frames in Environmental Separation System locations, perform all work to requirements of Section 070500. For doors and frames within building interior, perform all work to requirements of Section 090500.
3. The Contractor and Trade supplier are cautioned that the work of this Section includes the provision of all glazing and door hardware, excepting only the auto door operators, locksets, strike plates, and electric strikes for hinged doors. All other hardware to doors and frames described by this Section shall be provided by the Aluminium Door and Frame Trade Contractor, and not by any Cash Allowance. All shop prep of doors and frames for auto door operators, locksets, strike plates, and electric strikes shall be provided by the Aluminium Door and Frame Trade Contractor to suit the specific hardware that will be provided by other Trade Contractor.

1.2. Related Requirements

- | | |
|--|----------------------|
| 1. Emergency Egress System | Section 019521 |
| 2. Barrier-Free Path of Travel System | Section 019530 |
| 3. Metal Fabrications | Section 055000 |
| 4. Rough Carpentry | Section 061000 |
| 5. Fire and Smoke Protection Systems | Section 078400 |
| 6. Joint Protection | Section 079000 |
| 7. Hardware to Openings | Section 087000 |
| 8. Auto Door Operator and Related System | Section 087150 |
| 9. Glazing to Openings | Section 088000 |
| 10. Interior Finishing System | Section 090500 |
| 11. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 12. Painting and Coating | Section 099000 |
| 13. Window Films (N.I.C.) | Section 125250 |
| 14. Electrical | Elec. Docs. & Div 26 |
| 15. Communications Systems General Work Requirements | Division 27 |
| 16. Electronic Safety & Security Systems General Work Requirements | Divisions 28 |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Complete detailed shop drawings of doors and hardware. Include door and frame schedules, materials and finishes, hardware preparations and frame anchorage details.

1.4. Co-ordination

1. Work Supplied but whose Installation is by Other Trade Contractor
 1. Supply frames and anchors to those performing work of other Sections where it is necessary to built frames into work of other Sections, for installation by related trades.
 2. Supply instructions to other Trade Contractors as required for accurate positioning and proper installation of components supplied to those trades.
 3. Note that drawings do not show required widths of frames to suit partition and wall conditions and assemblies. The Supplier and the Contractor shall co-ordinate the shop drawing submission to suit all assemblies, and the Contract includes all required widths of

frames to suit conditions.

2. Work Described in Other Sections Requiring Co-ordination by this Trade Contractor

1. The supplier of aluminium doors and frames under this Section shall co-ordinate and provide door and frames to suit all requirements and prep for wiring of hardware provided by other Trade Contractor.

1.5. Reference Standards and Codes

1. Unless otherwise specified, meet the requirements of the "Canadian Manufacturing Specification for Steel Doors and Frames" and "Recommended Dimensional Standards for Commercial Steel Doors and Frames" published by The Canadian Steel Door Manufacturers' Association.

1.6. Quality Control

1. Acceptable manufacturers: Member of The Canadian Steel Door Manufacturers' Association.

1.7. Basic Product Requirements

1. Tag doors and frames at shop with identification indicating proper location for installation.
2. Deliver, store and handle components so as to prevent damage, distortion and corrosion. Store components off the ground and under cover in a dry protected area. Stack doors and frames to prevent twisting. Do not enclose components in plastic covers without venting.
3. Co-ordinate frame and door height with floor finishes, and with partition jointing, to ensure installation provides best fit and operation in each location.

1.8. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended, except that aluminium doors shall be warranted against defect in material or workmanship for a period of 3 years.

1.9. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Systems Commissioner responsible for the system:
 1. Emergency Egress System, providing components, as described in Section 019521
 2. Barrier Free Path of Travel System, providing components, as described in Section 019530
 3. Environmental Separation System for Interior Environments, providing components, as described in Section 070500
 4. Interior Finishing System, providing components of that System, as per Section 090500
 5. Security and Door Access Control Systems, as further described in Divisions 27 and 28.

2. PRODUCTS

2.1. Materials

1. Sheet Steel: hot dipped galvanized (wipe coated) cold rolled steel with stretcher level degree of flatness, meeting requirements of ASTM A924M-16 and ASTM A A653M-15e1, minimum zinc coating designation ZF120.

2. Sheet Stainless Steel for stainless door frames where indicated: S316 Stainless, 1.5 mm thick. Note that S304 stainless is not acceptable for stainless door frames.
3. Finishing materials:
 1. Touch up paint: zinc rich paint CAN/CGSB-1.181-92.
 2. Metal filler: two-component epoxy type.
4. Acceptable Products for Aluminium Doors:
 1. Alumicor Limited: 400A Series Canadiana, complete with single glazing
5. Acceptable Products for Aluminium Frames and doors at each departments from corridor or other department:
 1. Alumicor, Flushglaze TL 1800 Storefront Framing System; non-thermally broken storefront system, complete with double glazed units.

2.2. Hardware Preparation

1. Obtain full hardware specifications and list, as well as templates, prior to final fabrication of doors and frames. Co-ordinate all preparation with this list and review Contract Documents for potential discrepancies. Report any discrepancies to the Consultant for instruction.
2. Prepare for cylindrical hardware, in strict co-ordination with hardware schedule, except where specified otherwise. Provide cylindrical lock preparation to ANSI A115.2, including integral latch case support.
3. Blank, reinforce, drill and tap doors and frames for concealed and cylinder or mortised hardware. Reinforce doors and frames for surface mounted hardware. Provide door closer reinforcement at all doors and frames whether closer is required by hardware list or not. Provide doors and frames to receive alarm system contact switches, electric strikes, auto door operators, and similar components of other systems.
4. Prepare for routing of cabling for door access control systems and intrusion detection systems, as well as electric strikes and other interfaces with hardware, doors, and frames, so that all such cabling can be easily field installed after initial frame install.

2.3. Aluminium Doors

1. Join door face sheets at vertical edges by tack welding. Render joints invisible by filling, grinding and dressing smooth; mechanically locked joints are not acceptable.
6. Hardware reinforcements shall be minimum 3.4 mm thick in addition to door skin thickness. Provide continuous reinforcement at continuous hinges.
7. Surround glazed and louvered openings in flush doors with 1.2 mm thick steel edge channels, welded to both face sheets.
8. Provide removable glazing stops of zinc coated steel channels butted at corners, accurately fitted into position and fastened with oval head Philips screws.
9. Glazing stops at outside of exterior doors shall be non-removable.

2.4. Frames and Screens

1. Provide setup and weld frames for all frames and screens. Provide T-style centre mullions. Form glass and door stops integrally with frame; do not add as a separate profile. Ensure prep is for double minimum 6 mm glass in all cases. For double-glazed units, form integral stop such that glazing unit centres on the screen thickness. Form single-glazed units for doors, ensuring

the preparation is suitable for a minimum 6mm glass thickness.

2. Assemble components with accurately cut joints. Mitre outside corner joints of frames continuously. Weld joints for SUW frames on inside of profile; grind welds, flush and sand to smooth uniform surface. Tabbed and spot-welded construction is not acceptable.
3. Fit and assemble work in the shop wherever possible, eliminating field joints.
4. Glazing stops for screens shall be minimum 0.9mm thick steel, mitred at corners, drilled and secured with oval head screws.
5. Side lite and transom framing shall be of same thickness metal as adjacent door frame.
6. Drill interior door frames for rubber bumpers. Drill strike jamb of each single door frame for 3 bumpers. Drill head member of double door frames for 2 bumpers.
7. Provide angle or channel door head reinforcement for doors wider than 915 mm.
8. Tack weld two removable minimum 1.2 mm thick steel spreader channels to inside faces of door frames at base, for all set-up and welded frames.
9. Provide adjustable base clips for anchorage to floor at bottom of each door jamb.
10. Hardware reinforcements shall be minimum 3.4mm thick exclusive of frame thickness. Provide hardware reinforcement at all hardware fastening points.
11. Fabricate frames, screens and sidelites with due attention to interior elevations. Where high bases are shown to floor height sidelites or added height to head is shown for masonry joint co-ordination provide such configurations as included in the base requirements of the Contract and Contract Price.

2.5. Finishes

1. Fill seams, corner joints and other depressions with filler and sand smooth.
2. Clean and remove all traces of oil, grease and other foreign substances to ensure proper bond of touch up after fabrication.
3. Touch up damaged zinc coating with zinc rich paint.
4. Isolate, where necessary to prevent electrolysis, metal surfaces in contact with dissimilar metals or cementitious materials.

3. EXECUTION

3.1. Installation General

1. Complete installation shall be by the trade contractor supplying the doors and frames of this Section, in accordance with reviewed and accepted submittals.

3.2. Frame Installation

1. Allowable limit of distortion shall be 1.5 mm out of plumb at each jamb, measured on face of frame, resulting in maximum twist of frame of 3 mm measured from upper corner to lower diagonal corner.
2. Generally, anchorages of frames shall be by means of standard anchors for each jamb material condition. Where standard anchors cannot be used, provide special anchors to ensure proper installation.

3. Provide minimum 3 anchors at each jamb. At frames exceeding 2150 mm in height provide one additional anchor for each additional 610 mm, or part thereof.
4. Anchor immediate intermediate vertical frame members to structure above as required to ensure stability. Where required, provide steel frame extensions. Provide flexible connection at structure to allow for deflection.
5. Remove steel shipping spreaders to SUW frames; install wood installation spreaders at sill and at third points of frame rabbet height to maintain constant frame width. Remove wood spreaders only after frames are securely anchored in place.

3.3. Touch-up

1. Touch up of aluminium finishes and glazing is not permissible. Where doors, frames, or glazing are defective in surface finish they shall be replaced complete.

3.4. Glazing

1. This Trade Contractor supplies and install glazing for doors in accordance with this Section and Section 088000 - Glazing.
2. All glazing shall be by dry-glazed methods and to the recommendations of the specific aluminium door and frame system component manufacturer.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. The Contractor and Trade supplier are cautioned that the work of this Section is subject to required Alternative Prices in the Bid Forms. Trade Supplier shall furnish the Contractor with all pricing information necessary to complete the bid forms.
3. The work of this Contract includes the supply of all solid wood hinged doors that are to be installed in the Owner's Demountable Partition Systems, complete with stain and finish and all hardware preparation. Turn over these doors at Substantial Completion such that the door installations can be completed by Owner's Demountable Partition Trade Contractor. Note that doors to the Demountable Partitions may be custom-sized. See Opening Schedule.

1.2. Related Requirements

- | | |
|--|----------------|
| 1. Emergency Egress System | Section 019521 |
| 2. Fire Separation System | Section 019522 |
| 3. Barrier-Free Path of Travel System | Section 019530 |
| 4. Selective Demolition & Cleaning | Section 024119 |
| 5. Joint Protection | Section 079000 |
| 6. Steel Doors and Frames | Section 081113 |
| 7. Hardware to Openings | Section 087000 |
| 8. Auto Door Operator and Related System | Section 087150 |
| 9. Glazing to Openings | Section 088000 |
| 10. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 11. Finishes | Division 09 |
| 12. HVAC Air Distribution Systems | Mech. Docs. |
| 13. Electrical | Elec. Docs. |
| 14. Communications Systems | Divisions 27 |
| 15. Security and Access Control Systems | Divisions 28 |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Complete detailed shop drawings of doors and hardware preparation, and schedule of doors and required sizes cross-referenced to Opening numbers.

1.4. Reference Standards

1. Fabricate wood doors to CSA 0132.2 M and Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) Custom Grade, except where specified otherwise.

1.5. Quality Control

1. Meet requirements of CAN/CSA-0132.2 Series 90 except where specified otherwise.
2. Installation work described herein shall be performed by acceptable finish carpenters and is further described in Section 062000 as well as this Section.

1.6. Basic Execution Requirements

1. Protect doors from dampness. Arrange for delivery after work causing high humidity has been completed.

2. Store or hang doors in dry buildings away from damp, moist or freshly plastered areas. Doors must not be subjected to abnormal heat, dryness or humidity.
3. Seal top and bottom and side edges of doors immediately after fitting and cutting for closers, weatherstrip and /or threshold, with products and execution as described in Section 099000, with two coats of paint, varnish or sealer to prevent undue absorption of moisture.
4. Wrap doors to protect doors from scratches, handling marks and other damage.
5. Label each door with manufacturer's name, product identification, door size and type.

1.7. Warranties

1. Warrant in accordance with Division 1 requirements and GC12.3.1 and 12.3.4, and further:
 1. At no cost to Owner the Contractor and the Trade Contractor performing the work of this Section shall remedy any defects in work of this Section due to faulty materials and/or workmanship for a period of three (3) years from date of Substantial Performance.
 2. Defects covered under the above warranty shall include warp exceeding 6mm (1/4").
 3. Warranty shall cover all costs for replacement of defective doors including hanging, fitting and finishing.
 4. The Contractor shall additionally provide standard manufacturer Product warranties in accordance with GC12.3.6.

1.8. Building Systems Requirements

1. The work described by this Section is related to the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirements of the component in relation to the system. Obtain clarification from the contractor and the trade contractor responsible for the system, as set out in Section 019010:
 1. Interior Finishes System
 2. Fire Separation System
 3. Emergency Egress System
 4. Barrier-Free Path of Travel System
 5. Fire Alarm System, for doors and frames to release upon activation upon fire alarm
 6. Air Distribution System, for grilles and undercutting where indicated
 7. Security Systems (Access Control Systems)

2. PRODUCTS

2.1. Solid Core Doors

1. Flush doors, 45mm thick, meeting requirements specified herein, by one of the following:
 1. Cambridge Forest Products
 2. Dormond Industries
 3. Lambton Doors
 4. Weyerhaeuser Canada Ltd.
 5. Other manufacturers accepted by Consultant.
2. Core: solid particleboard, to CAN3-188.1M78, Type II Grade E. For fire-rated doors, provide core in accordance with fire test requirements.

3. Crossbanding: approximately 1.5 mm thick hardwood veneer laminated to each face of core at doors requiring plastic laminate facing.
4. Finishes and facings: masonite slab both sides, for paint finish by the work of Section 099000.
5. Factory prepare doors for hinges, locks and other hardware. Make changes to existing doors required for new hardware in shop wherever possible.

3. EXECUTION

3.1. Installation

1. Installation of wood doors shall be by fully qualified finish carpenter.
2. Inspect frames to ensure proper installation, true & vertical, securely & permanently fastened.
3. Prepare doors in accordance with templates supplied by Section 087000. Shop prepare doors to minimise onsite prep work.
4. Sizing for height: door height to be distance from top of finished floor to underside of head lining or frame less thickness of threshold as applicable, and 3 mm play.
5. Sizing for door width to be distance between jamb lining or frame members less 3mm play.
6. Lock edge bevel: bevel lock edge of door 3 mm.
7. Hang doors vertical and true, using hardware hinges without shimming.
8. Install remainder of hardware in accordance with hardware supplier's instructions.
9. Adjust operable parts to ensure proper door operation.

3.2. Adjustment

1. Just prior to Substantial Performance of the Work, re adjust doors and hardware to function freely and properly.

3.3. Protection and Cleaning

1. Protect this portion of the Work until acceptance of the Work by the Owner. Provide final cleaning.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|---|-------------------|
| 1. Cash Allowances | Section 012020 |
| 2. Emergency Egress System | Section 019521 |
| 3. Barrier Free Path of Travel System | Section 019530 |
| 4. Metal Fabrications | Section 055000 |
| 5. Rough Carpentry | Section 061000 |
| 6. Steel Doors and Frames | Section 081113 |
| 7. Wood Doors | Section 081400 |
| 8. Automatic Door Operators and Related Systems | Section 087150 |
| 9. Installation of Owner-supplied Equipment | Section 110500 |
| 10. Hardware for Electrical and Mechanical | Divisions 20 & 26 |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. A detailed hardware schedule.
 2. Meet with Owner to determine keying system. Prepare and submit keying schedule.
 3. Record of inspection for all rated doors after inspection. Provide an inspection by a certified door and hardware inspector qualified under NFPA to provide such inspection and submit copy certifying installation of the doors, frames, and hardware to meet the latest standards for such fire protected openings.

1.4. Co-ordination and Systems Workshop

1. Hardware described Elsewhere:
 1. Further hardware supply and installation is described in the following Sections:

Sections 055000 and 057000, for hardware to gates and similar miscellaneous items
Section 062000 for standards and requirements for hardware installation where performed by finish carpenters.
Section 064000 for hardware to millwork and case goods.
Section 081113 for portions of hardware within Steel Doors and Frames (Interior Screens)
Section 081316 for portions of hardware within Aluminium Doors and Frames (Interior Screens)
Section 087150 for portions of automatic door operators
Section 102219 for aspects of hardware within Owner's Demountable Partition Systems that will be installed following this Contract and that depend upon supply and installation of hardware at that time.
 2. The Contractor shall convene an online meeting workshop with all door, frame, controls, hardware, ADO trade contractors and suppliers, Contractor's Commissioning Co-ordinator, Owner, and Consultant to review all hardware requirements. See also Section 087150.
 3. Furnish all templates required for hardware preparation and installation. Issue templates when requested so as not to cause any delays, but not before final acceptance of hardware list.
 4. Co-ordinate installation of hardware to follow finishing and painting work, not before.

5. Co-ordinate delivery and installation of hardware to achieve construction sequencing and the handover of areas of the completed work to the Owner without temporary hardware. In case of delivery failure, provide temporary hardware at no cost to Owner.

1.5. Reference Standards and Codes

1. 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. Meet requirements of Ontario Building Code and other applicable regulations, including accessibility standards.
3. Hardware for doors in fire separations and exit doors: certified by a Canadian Certification Organization accredited by Standards Council of Canada and recognized in the OBC.

1.6. Basic Product Requirements

1. Deliver each hardware item packaged separately in individual containers with necessary screws, keys, instructions and installation templates.
2. Mark each container with item number corresponding to number shown on hardware schedule with respective door number.
3. Store hardware in locked, clean and dry area and secure against theft.

1.7. Basic Execution Requirements

1. The Work of this Section shall be performed by finish carpenters and mechanics experienced in hardware installation, in conjunction with work described in Section 062000 and Section 081113.
2. Upon completion of finish hardware installation, hardware supplier's qualified representative shall inspect work and shall certify in writing that all items and their installation are in accordance with requirements of Contract Documents and are functioning properly. This document shall be included in the Maintenance Manuals.

1.8. Maintenance Manuals and Materials

1. Submit in accordance with Division 1 requirements:
 1. Operation and maintenance data for door closers, locksets, door holders and fire exit hardware for incorporation into manual.
 2. Brief maintenance staff regarding proper care, cleaning, and general maintenance.
 3. Two sets of wrenches for door closers. Deliver directly to the Owner. Under no circumstances leave at the job site.

1.9. Warranties

1. Warrant all work in accordance with Division 1 requirements.
2. Additionally, provide all Products warranties complete with registration and contact information for hardware product, executed in favour of the Owner.

1.10. Identification of Building Systems

1. The work of this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall

not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:

1. Emergency Egress System, to provide components of that system, as per Section 019521
2. Environmental Separation System, to provide components of that system, as described in Section 070500
3. Interior Finishing System, to provide components of that system.

2. PRODUCTS

2.1. General

1. Use one manufacturer's products only for all similar items.
2. All preparation of doors and frames shall be performed at shop by the suppliers and trade contractors performing the work of Sections 081113, 081316, and 102219. Provide all templates to these trades and suppliers to meet schedule and delivery requirements.

2.2. Only certain hardware shall be supplied by Material Supply Cash Allowance. For all hardware noted in this section as "Not by Cash Allowance", supply this hardware as scheduled or indicated for each opening, and pay all costs. Only hardware noted as "by Material Supply Cash Allowance" shall be covered by the Cash Allowance listed in Division 01 of the specification.

2.3. Locksets, Latchsets, Rim Cylinders, Keying (by Material Supply Cash Allowance)

1. To match existing City of Waterloo hardware and keying system:
 1. Schlage ND series cylindrical leversets and locksets with Schlage "CE" - interchangeable core keyway with 6 pin configuration to suit City master key system. No other locksets or latchsets permitted, except as otherwise noted herein.
 1. Rim cylinders shall be to suit latches, deadbolts, and hardware supplied under other Sections (for instance aluminium interior screens and partition systems) or for use in other hardware described in this Section, Schlage "CE" interchangeable core keyway with 6 pin configuration to suite City master key system.
 3. Deadbolts shall be Schlage L Series small mortice to suit 6 pin, Schlage "CE" interchangeable core keyway with 6 pin configuration to suite City master key system. Keyed outside, thumb turn on inside. Provide to suit thickness of door and cylinder requirements.
2. Locks shall be keyed to the Owner's master key system as directed by the Owner. Keying and delivery of keys to Owner shall be by the Owner's nominated locksmith.
3. Locks and cylinders shall be construction master keyed only where there is significant lag time between door installation and handover to the Owner.

2.4. Hinges (by Material Supply Cash Allowance for wood and steel doors only)

1. All hinges shall be 2 or 4 race ball bearing. Interior hinges shall be stain chrome plated (C26D) sized according to door height and weight and frequency of operation. All exterior hinges shall be solid brass dull chrome plated or stainless steel complete with non-removable pins (NRP). Concealed bearing hinges are not acceptable. Stanley FBB179.
2. Continuous Hinges where scheduled shall be full surface, heavy duty, 780-157HD, Hager.

2.5. Stops (by Material Supply Cash Allowance for all swing doors)

1. Wall Stops shall be GSH 250 or similar.
 2. Overhead stops shall be 904S.
 3. Floor Stops are not required as part of this project.
 4. Kick Down Holders shall be Glynn Johnson GJ 44, 26D.
- 2.6. Kick-plates (by Material Supply Cash Allowance for swing doors designated in opening schedule)
1. Stainless Steel, GSH 80A or equivalent, 150mm (6") tall, width to suit door.
- 2.7. Push-plates & Door Pulls – Used this project for sliding doors within Demountable Partition systems, for complete provision by that Trade Contractor (N.I.C.)
- 2.8. Thresholds - Not used this Project.
- 2.9. Closers (by Material Supply Cash Allowance for swing doors not receiving auto door operator mechanisms)
1. Surface mounted unless otherwise noted, handed and non-handed, sized to operate door efficiently and to suit swing of doors, c/w back checking features. LCN. For pull side mounting use 4010 Series. For push side mounting use 4110 Series. For top jamb mounting use 4021. For high frequency doors and entrances model 4030 Series may be used. Equivalents by Sargent are acceptable.
- 2.10. Exit Devices - Not used this Project.
- 2.11. Weather-stripping/Sound Seals - of appropriate shore hardness for all swing hinged doors, by Material Supply Cash Allowance for all swing doors where scheduled).
- 2.12. Automatic Door Bottoms – by Material Supply Cash Allowance for swing doors where scheduled in Opening Schedule)
- 2.13. Surface Bolts - Not used this Project.
- 2.14. Flush Bolts- Not used this Project.
- 2.15. Automatic Door Operators – see specification Section 087150, not by Cash Allowance
- 2.16. Electric Strikes - see specification Section 087150, not by Cash Allowance
- 2.17. Accessible Push Column-style Switches - see specification Section 087150, , not by Cash Allowance
- 2.18. Hold Open Devices - Not used this Project.
- 2.19. Door Bumpers (by Material Supply Cash Allowance for steel door frames only)
1. Glynn-Johnson FB 13, 26D, for each new door where floor stop scheduled.
- 2.20. Lock Protectors (Latch Guard Cover Plates) (by Material Supply Cash Allowance)
1. Glynn-Johnson model LP3, c/w prime painted finish for steel framed openings, otherwise equivalent pre-finished satin stainless
- 2.21. Blank-out Kits (by Material Supply Cash Allowance)
1. Shall be #161 Filler Plates, painted to match door where required for existing doors. Kits shall not be used on new doors.
- 2.22. Removable Mullions (Lockable) – Not applicable this Project.
- 2.23. Exterior Door Pulls - Not applicable this Project

2.24. Fasteners (supplied by Material Cash Allowance unless for items specified in 062000, 081113, 081316, 087150, 102219)

1. Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
2. Exposed fastening devices to match finish of hardware.
3. Where a pull is scheduled on one side of door and push plate on the other, supply fastening devices, and secure pull through door from reverse side. Install push plate to cover fasteners.
4. Use fasteners compatible with material through which they pass.
5. Exposed screws for installing hardware shall have tamper proof heads.

3. EXECUTION

3.1. Installation

1. Furnish wood door, metal frame and metal door manufacturers with complete instructions and templates for preparation of their work to receive hardware.
2. Furnish manufacturers' instructions for proper installation of each hardware component.
3. Meet requirements of ANSI/DHI A115.1 G-94 "Installation Guide for Doors and Hardware".
4. Install finish hardware in accordance with hardware supplier's directions. Ensure that hardware is installed correctly. Issue instructions if required to Sections concerned.
5. Unless otherwise directed by the Consultant, or unless otherwise dictated by glass height or rail location, install finish hardware at the following heights above finish floor:

| | |
|---------------------------|---------------------------------|
| 1. Locksets and Latchsets | 1025mm to centre of strike |
| 2. Deadlocks | 1200mm to centre of strike |
| 3. Panic Bolts | 1025mm to underside of push bar |
| 4. Push Plates | 1065mm to centre of plate |
| 5. Guard Bars | 1065mm to centre of bar |
| 6. Door Pulls | 1065mm to centre of pull |
6. Where door stops contact door pulls, mount stop to strike bottom of pull.
7. Install permanent cores and check operation of all locks.
8. Do not install wall stops on drywall partitions without blocking support.

3.2. Schedule

1. Install Finish Hardware according to the Openings Schedule and accepted hardware schedule, and in strict accordance with manufacturers' instructions and Code regulations.
2. Install hardware to all wood and steel doors and steel frames, as described in Sections 081113 and 062000.
3. Provide all hardware to accomplish the intent of functions and as scheduled in the Openings Schedules for this Work. All minor items of accessory necessary and reasonably inferable to complete the hardware and to achieve door performance are included in the Work, at no further cost to the Owner once hardware schedule is reviewed and accepted.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Provide automatic door operators (ADO), electric strikes, and all related wiring and interface with Door Access Control System, to all openings indicated for ADO.
3. Provide electric strike to all other doors receiving card reader access control in the Door Access Control System, whether the opening has ADO or not.
4. Card reader units and wiring of card readers shall be supplied and installed by the Owner's nominated Door Access Control Trade Contractor, as per Division 28.
5. This Section describes the required sequences of operation that shall be provided by the Automatic Door Operator Trade Contractor. Include all costs, including but not limited to the cost of 12V and/or 24V transformers as required for each opening.
6. All devices and work described by this Section is included in the Contract and Contract Price, but is not included in any Cash Allowance. Include all costs.

1.2. Related Requirements

- | | |
|--|----------------|
| 1. Emergency Egress System | Section 019521 |
| 2. Barrier Free Path of Travel System | Section 019530 |
| 3. Metal Fabrications | Section 055000 |
| 4. Rough Carpentry | Section 061000 |
| 5. Finish Carpentry | Section 062000 |
| 6. Steel Doors and Frames | Section 081113 |
| 7. Aluminium Doors and Frames (Interior Screens) | Section 081316 |
| 8. Wood Doors | Section 081400 |
| 9. Hardware to Openings | Section 087000 |
| 10. Owner's Demountable Partition Systems | Section 102219 |
| 11. Conduit and Power, Time Clock if required | Division 26 |
| 12. Electronic Safety & Security Systems | Section 280500 |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Product Data: manufacturer's product and installation data for all components, complete with device schedule.
 2. Shop drawings and wiring diagrams for each opening, with complete sequence of control, showing all devices and controls and location of all transformers. Detail all external connections to line voltage power, Owner card reader, Owner's Security System, and any other connection required for the performance of the system.

1.4. Co-ordination and System Workshop

1. Hardware described Elsewhere:
 1. Hardware for Architectural Woodwork is described in Section 062000.
 2. General hardware to Openings is described in Section 087000.
 3. Metal doors and frames are described in Section 081113.
 4. Wood doors are described in Section 081316.
 5. Aluminium doors and frames for Interior Screens are described in Section 081316.

6. Demountable Partition Systems and related hardware are described in Section 102219.
 7. Security system work is by Owner's selected forces, as described in Division 28.
2. Furnish all templates required for preparation and installation. Issue templates when requested so as not to cause any delays, but not before final review of hardware list by Consultant. This includes templates supplied to the door and frame manufacturer for electric strikes and other devices.
 3. The Contractor shall convene an online meeting workshop with all door, frame, controls, hardware, ADO trade contractors and suppliers, Contractor's Commissioning Co-ordinator, Owner, and Consultant to review all hardware requirements. See also Section 087000.
 4. Co-ordinate installation of devices to follow finishing and painting work, not before.
- 1.5. Reference Standards and Codes
1. 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. Meet requirements of Ontario Building Code and other applicable regulations, including accessibility standards. Meet requirements of the Owner's Facility Accessibility standards.
 3. Comply with the most recent edition of the following for the systems:
 1. ANSI A117.1 Buildings and Facilities - Providing Accessibility and Usability for Physically Disabled People; and
 2. ANSI A156.19 Power Assist and Low Energy Power Operated Doors
- 1.6. Quality Control
1. The Trade Contractor performing the work of this Section shall be the System Commissioner for each installation of door control systems, and shall perform all duties as set out in Division 1 for Building Systems and Commissioning. Co-ordinate among this section, hardware suppliers, Owner's access control and security, and electrical Trade Contractors.
 2. The work of this Section shall be performed by one of the following qualified firms:
 1. Ventri Door Technologies, contact Chris Hystead, Chris.Hystead@ventri.ca, 519-642-4700
 2. Safeguard Access Products, contact Jason Dawtrey, jason@safeguardaccessproducts.com, 519-212-2176
 3. William Knell & Company Limited, contact Vishal Kachchhi, vkachchhi@knells.ca
 4. accepted Trade Contractor as issued by Addendum during the bid period.
 3. Further firms wishing to bid the work of this Section must submit qualifications to Consultant and Owner during the bid period, for acceptance by addendum only.
- 1.7. Basic Product Requirements
1. Deliver each device item packaged separately in individual containers with necessary screws, keys, instructions and installation templates.
 2. Mark each container with item number corresponding to respective opening number.
 3. Store devices in locked, clean and dry area and secure against theft.
- 1.8. Basic Execution Requirements
1. Upon completion of installation, the Trade Contractor performing the work of this Section shall certify in writing that all items and their installation are in accordance with requirements of

Contract Documents and systems are functioning properly through each and all sequences of operation, for each opening. This document shall be included in the Maintenance Manuals.

1.9. Maintenance Manuals and Materials

1. Submit in accordance with Division 1 requirements:
 1. Operation and maintenance data for incorporation into manual.
 2. Brief maintenance staff regarding proper care, cleaning, and general maintenance.

1.10. Warranties

1. Warrant all work in accordance with Division 1 requirements.
2. Provide a three (3) year manufacturer's warranty on automatic door operators, and push button switches, against defect in material and workmanship, from the date of substantial completion.
3. Additionally, provide all Products warranties complete with registration and contact information for hardware product, executed in favour of the Owner.

1.11. Identification of Building Systems

1. The work of this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:
 1. Emergency Egress System, to provide components of that system, as described in Section 019521;
 2. Environmental Separation System, to provide components of that system, as described in Section 070500; and
 3. Interior Finishing System, to provide components of that system.

2. PRODUCTS

2.1. General

1. Use one manufacturer's products only for all similar items, and ensure all components are compatible.
2. All preparation of doors and frames shall be performed at shop by the supplier performing the work of Section 081113. Provide all templates to these trades and suppliers to meet schedule and delivery requirements.

2.2. Automatic Door Operators (ADO)

1. Record 8100, or equivalent to City of Waterloo standard, with no exposed on/off switch, wherever scheduled. Operator shall be installed by the authorized dealer. Equivalents by other suppliers and manufacturers are acceptable only where accepted by Owner during the bid period. The unit must be capable of receiving wireless signal from Accessible Push Button Switches, regardless of wired or wireless installation.

if alternate product is proposed, it shall meet the following criteria:

Latch Assist/ Stack Pressure Assistance : Latch assist function assures closing in areas with

heavy stack conditions commonly associated with doors in air conditioned and heated environments.

Obstruction Stop : This feature will stop the operator from opening when it engages with an obstruction during its opening process.

Non-handed, can be field reversible, for different door handing (Left/ Right Hand).

Onboard Electric Strike Relay : Relay on the control board built in to control electric strike.

For the wireless components, below Camden specs and features shall be met.

Equivalent to Model Camden- TX-9 Transmitter

Frequency : Operates in the 902-928 MHz

Codes 1 million (20bit) codes

Built-in Piezo sounder Used for Low Battery status, Battery life Minimum 500,000 operations
Range Over 500 ft (open area) Temperature rating (-40 to +85°C)

2. The ADO unit shall be capable of accepting low voltage signal from a time clock provided by the Electrical Trade Contractor, and shall instruct all door access control components in the accomplishment of all required sequence of operation for the opening.

2.3. Electric Strikes (ES)

1. Electric Strikes shall be Camden, fully compatible with mechanical lock hardware and all components of the door access systems. All electric strikes shall have field-selection capability for "fail open" and "fail secure" options for installation and for post-installation adjustment if necessary.
2. Ensure compatibility prior to ordering Products, at submission stage.
3. Electric Strikes shall be supplied and installed in Contract, including all prep and wiring with interlink to automatic door operator, Push-to-Lock functions, card reader control and similar. Configuration and model of strikes shall be co-ordinated with any exit devices. Contractor and this Trade Contractor shall co-ordinate door and frame prep to allow for wiring rough-in.

2.4. Accessible Push Button Switches (PB)

1. Camden Door Controls surface mounted wall switch, CM-7536 36 Column, with "Push to Open" and accessible signage, clear anodized aluminium finish, or equivalent by Micom, Besam or Dorma. Model shall provide wired control to Auto Door Operators unless indicated for wireless.
2. Push-to-lock (PTL) control subsystem, where required for washrooms, Camden Door Controls CM-400 series, complete with signage.

2.5. Emergency Call Assist

1. Not applicable this Project.

2.6. Card Readers (CR)

1. All Card Access Readers shall be supplied and installed by the Owner's Nominated Access Control and Intrusion Detection System Contractor and are devices of the Security Systems, as set out in 087000 & Section 280500.
2. Notwithstanding the above, the work of this Section includes all wiring connection work for control and interface of Card Readers with Auto Door Operators, as well as all coordination of

system components to ensure complete and functional security system rough-in and wiring with electric strikes, by the Electrical Trade Contractor, and all coordination of system components is by the GC working with the door hardware supplier, the door supplier and the Owner's nominated Door Access Control Contractor.

2.7. Transformers

1. Supply all low voltage transformers required for operation of the door access systems, whether 24V or 12V, for handover to the Electrical Trade Contractor for installation. The transformer may form integral part of the ADO unit where the opening is scheduled for ADO, but otherwise must be supplied separate or as part of the card reader or Push-to-Lock controls for all other openings. These include but are not limited to:
 1. Transformer for the low voltage signal between time clock and ADO unit or Push-to-Lock units in each instance;
 2. Transformer for the low voltage signal to electric strike on doors controlled by card reader but without ADO; and
 3. Transformers to suit the requirements of the Push-to-Lock and electric strike for control of access to openings scheduled for Push-to-Lock.

2.8. Fasteners

1. Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
2. Exposed fastening devices to match finish of hardware.
3. Use fasteners compatible with material through which they pass.
4. Exposed screws for installing hardware shall have tamper proof heads.

2.9. Emergency Panic Button and Emergency Sign

1. Not required this Project.

3. EXECUTION

3.1. Preparation

1. Furnish door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware and devices.
2. Furnish manufacturers' instructions for proper installation of each device component to each trade contractor or supplier involved in work which is connected to the work of this Section.
3. At Submittal stage for the project, the nominated System Commissioner employed by the Trade Contractor performing the work of this Section shall convene a System Workshop, to be attended by the Trade Contractor, Consultant, Electrical Trade Contractor, mechanical hardware supplier, Owner, and Owner's Security System trade contractor.
4. All sequences of operation for each opening shall be discussed and clarified,

3.2. Installation

1. Provide all wiring to connect all components of the systems as required to accomplish the sequences of operation, using conduit pathways and within frames and adjacent construction.
2. Provide all control components within ADO's and Push-to-Lock systems and locate to agreed accessible locations in the Work.

3. Meet requirements of ANSI/DHI A115.1 G-94 "Installation Guide for Doors and Hardware".
4. Install devices in accordance with supplier's instructions. Ensure that device is installed correctly by testing device prior to system start-up or final commissioning of the systems, in accordance with the requirements set out in Division 01 for commissioning of systems.

3.3. Schedule

1. Install devices according to the Openings Schedule and accepted hardware schedule, and in strict accordance with manufacturers' instructions and Code regulations.
2. Install all hardware to accomplish the intent of functions and as scheduled in the Openings Schedules for this Work. All minor items of accessory necessary and reasonably inferable to achieve door performance are included in the Work, at no further cost to the Owner once hardware schedule is reviewed and accepted.

3.4. Sequences of Operation and Commissioning of Systems

1. See Architectural Drawings for required operation of each opening. Provide all ADO and Push-to-Lock systems to accomplish the Sequences of Operation, and where applicable connect to Time Clock for control of aspects of the devices to meet the sequence requirements and status conditions upon completion of each sequence.
2. This Trade Contractor and the Contractor shall submit completed checklists of tests performed on each component of the systems and shall certify performance of the systems to all sequences of operation.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. All glazing to aluminium doors and frames (Interior Screens) shall be by this Contract and in accordance with this Section, but provided by the Trade Contractor performing the work of Section 081316.
3. All glazing to demountable partition system provided by Owner's forces after Substantial Completion of the Work shall be by separate Owner Contract and in accordance with this Section, but provided by the Trade Contractor performing the work of Section 102219 (N.I.C.).

1.2. Related Requirements

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|--|----------------------------------|
| 1. Emergency Egress System | Section 019521 |
| 2. Fire Separation System | Section 019522 |
| 3. Barrier Free Path of Travel System | Section 019530 |
| 4. Rough Carpentry | Section 061000 |
| 5. Architectural Woodwork | Section 064000 |
| 6. Solid Surface Fabrications | Section 066100 |
| 7. Joint Protection | Section 079000 |
| 8. Steel Doors and Frames | Section 081113 |
| 9. Aluminium Doors and Frames (Interior Screens) | Section 081316 |
| 10. Wood Doors | Section 081400 |
| 11. Hardware to Openings | Section 087000 |
| 12. Interior Finishes Systems | Section 090500 |
| 13. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 14. Painting and Coating | Section 099000 |
| 15. Installation of Building Signs | Section 101400 |
| 16. Demountable Partition Systems (N.I.C.) | Section 102219 |
| 17. Window Films | Section 125250 |
| 18. Electrical Lighting Systems | Division 26 & Electrical Systems |

1.3. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Detailed product data for each product required.
 2. Duplicate samples of every colour and pattern and type of glass required in the Work, unless it is specified in other Sections.
 3. All trade contractors performing work described in this Section, or incorporating glazing, shall submit a reviewed and accepted copy of all shop drawings pertaining to such items that incorporate glazing as components.
 4. All glazing in openings have fire-protection ratings (i.e. all glazing within fire separations).
 5. Detailed shop drawing of all glazed partitions and tempered glass panels at reception desks, fully dimensioned and showing all reveals, supports, stand-offs, fasteners, blocking requirements, etc.

1.4. Co-ordination

1. Co-ordinate delivery and installation of glazing to achieve construction sequencing and the handover of areas of the completed work to the Owner without temporary glazing. In case of delivery failure, provide temporary glazing at no cost to Owner.
2. Cooperate with Owner's Signage Supplier, who shall provide interior signage where mounted to glazing to Openings from expenditure from Cash Allowance.

1.5. Reference Standards and Codes

1. ASTM-D2240-97, Standard Test Method for Rubber Property-Durometer Hardness.
2. ASTM-E84-98, Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM-E330-97, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
4. CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
5. CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
6. CAN/CGSB-12.8-M90, Insulating Glass Units.
7. CAN/CGSB-12.9-M91, Spandrel Glass.
8. CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
9. CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric Chemical Curing.
10. CAN/CSA-A440.2-09, Fenestration Energy Performance.
11. Insulating Glass Manufacturers Alliance (IGMA), Glazing Guidelines for Sealed Insulating Glass Units, 1997.
12. Glass Association of North America (GANA), Glazing Manual, 2005.
13. NFRC-100-2010, Procedure for Determining Fenestration Product U-Factors.
14. NFRC-200-2010, Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
15. NFRC-400-2010, Procedure for Determining Fenestration Product Air Leakage.
16. NFPA 80 - 2019, Standard for Fire Doors and Other Opening Protectives

1.6. Quality Control

1. Follow recommendations of the Flat Glass Marketing Association (USA) "Glazing Manual" latest edition.
2. Every pane of glass shall be factory labelled and label shall remain in place until final cleaning. Safety glass, and protective glass in rated openings shall have permanent identification.
3. Laminator qualifications: approved by interlayer manufacturer.
4. Installation of glass shall be by qualified glazier journeyman. Where glass is installed in openings having fire-protection rating, the installation forces shall be trained and certified by the supplier of the Listed and rated glass product.

1.7. Basic Product Requirements

1. Handle materials with care damage to surfaces.
2. Wrap in protective paper and removable plastic coating for shipping and installation. Protective plastic coating shall remain in place until instructed by Consultant to remove.
3. Store materials whether new, for alteration, or for re-use, off ground, under cover, protected from scratches or other damage and other construction activities. If broken, damaged, or defective replace at no cost to owner.

1.8. Warranty

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended, and further:
 1. At no cost to Owner, replace mirrors should defects in silvering occur within a period of

five (5) years from date of Substantial Completion.

2. All ceramic glass for use in fire protection for openings shall be warranted for conformance with NFPA 80 and performance to UL or ULC testing. Note that the particular supply of Listed protective glazing must correspond with requirements of the frame listing. Warranty shall not be voided by any such discrepancy in the finished installation, no matter the cause.

1.9. Maintenance Manuals

1. Provide maintenance data including cleaning instructions for incorporation into manual as described in Division 1.
2. Submit all custom tools required for glazed partition systems stand-offs/

1.10. Building Systems Requirements

1. The work described by this Section is a component of the following Systems. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved:
 1. Emergency Egress Systems;
 2. Fire Separation Systems;
 3. Barrier Free Path of Travel Systems;
 4. Environmental Separation Systems (when used in Exterior Wall components); and
 5. Interior Finishes System.
 6. Lighting Systems

2. PRODUCTS

2.1. Materials

1. Setting blocks: neoprene, Shore 'A' durometer hardness of 70 to 90 points, spacer shims, 40 to 50 points, and as recommended in writing by glass manufacturer for the specific glazing condition.
2. Glazing Sealant: one part silicone to CAN/CGSB 19.18 M87, and to meet the requirements of Section 079000. Dow Corning 790 or equivalent.
3. Glazing tape: polyisobutylene tape; acceptable product: Tremco 440 tape.
4. Glazing gasket: Tremco Vision Strip; colour selected by Consultant.
5. Tempered Glass: fully tempered float glass to CAN/CGSB-12.1-M90. Tempered glass identification must be sandblasted into glass and shall be visible after installation.
6. Laminated glass: clear and tinted laminated tempered float glass with PVB interlayer, to CAN/CGSB-12.1-M90.
7. Wired Glass (GWG or equivalent)
 1. Not permitted for use this project.
8. Ceramic Fire Glass to Protected Openings:
 1. Standard of Acceptance shall be "FireLite NT" by Technical Glass Products or equivalent "Pyran Platinum L" by Schott North America, or "Keralite L" by Vetrotech Saint-Gobain.

2. All glass to protected openings shall be provided to suit opening sizes, with appropriate Listed and tested product that is acceptable to latest NFPA 80 Standard and authorities having jurisdiction.
3. For further clarity, suppliers of glazing to this Section must carefully review opening sizes in door and frame types and the Openings Schedule located on Drawings. All supply of rating to suit the size of frame opening is included in the work of this Contract. Where Listing of the frame, door, sidelite, or protected opening requires a particular equivalent Listing for the glass, provide such glass and include all costs to achieve the size and configuration shown.
9. Float glass: clear float glass to CAN/CGSB-12.3-M91, Glazing Quality; unless otherwise shown.
10. Double-glazed sealed units for Glazing to Demountable Partitions as provided by the work of Section 102219 shall consist of 2 panes of 6 mm tempered glass separated by the manufacturer's standard system components and to suit the partition framing system. Note that thermal performance is secondary as the screens are interior.
11. Polished clear float glass for sliding doors and/or shelves in millwork where indicated in drawings shall be provided by the Millwork Trade Contractor in conjunction with the work of Section 064000.
12. Glass Stand-offs and Supports:
 1. Standard of Acceptance is Richelieu or C.R. Lawrence or equivalent. Heavy-duty type. 1 1/4" (32mm) diameter. Provide Slot Mount Standoffs to all perimeters, and double-sided stand-offs (min. 3/4" gaps between panel faces) and to suit panel layouts and to suit 1/2" tempered glass thickness and weights. Provide stand-offs complete with all gaskets, caps, fasteners. Finishes to be brushed stainless steel.
13. Patch Fittings to Glass Doors & Wall Systems: As set out in Section 081316 for Aluminium Doors and Frames (Interior Screens) and Section 102219 for Demountable Partitions.
14. Speak-Thru Inserts: CRL SST5 or equivalent, 5" (125mm) diameter. Brushed Stainless Steel, where the requirement is indicated on drawings.

3. EXECUTION

3.1. Framed Glass Installation General

1. Do not glaze when ambient or surface temperature is less than 5°C. Ensure that glazing rabbets, stops and glass are dry, free of frost, grease, oil, dust, rust and other substances detrimental to adhesion of compounds and sealants.
2. Provide clearance at perimeter edge of glass on all four sides, minimum equal to glass thickness. Accurately cut glass to fit openings, allowing for expansion in accordance with glass manufacturer's recommendations.
3. Provide sealer space between face of glass and glazing stops of minimum 3 mm.
4. Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying glazing tapes, gaskets and compounds. Use solvents and cleaning agents recommended by manufacturer of sealing materials.
5. Install glazing tapes uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet surfaces.

6. Set glass on setting blocks, spaced as recommended by glass manufacturer. Provide at least one setting block at quarter points from each corner.
7. Centre glass in glazing rabbet to maintain specified clearances at perimeter on all four sides. Maintain centred position of glass in rabbet and provide the required sealer thickness on both sides of glass.
8. Use spacers and shims in accordance with glass manufacturer's recommendations.
9. Ensure that steel, aluminium and wood glazing stops are pre-finished loosely and on all surfaces prior to beginning glazing operations. Where stops have been finished "insitu" report this defect to the Trade performing such finishing work. Upon sanding and refinishing of frames and loose stops, or replacement of stops where the defect cannot be remedied, begin glazing operations.
10. Mark each pane of glass to indicate presence of glass during construction.

3.2. Interior Glazing

1. Unless otherwise indicate glaze interior openings to steel and wood doors using the following method:
 1. Apply glazing tape to permanent stop; centre glass in opening and set on setting blocks; apply glass and press against tape.
 2. Apply glazing tape to removable stops and install stops. Trim tape for neat appearance.
2. For Aluminium Interior Screens and Demountable Partitions glaze within frames using dry glazing methods only, in conformance with system component manufacturer's details.

3.3. Cleaning

1. Remove dirt, scum, plaster, paint spatter, and other harmful and deleterious matter from glass promptly and completely, before they establish tight adhesion.
2. Avoid using abrasives, steel wool, razor blades, solvents, alkaline or harsh cleaning agents.
3. Remove glazing compound droppings promptly from all surfaces as the work progresses.
4. Replace scratched or otherwise damaged glass prior to final handover of the Work, regardless of how caused, without cost to the Owner.

3.4. Schedule

1. Provide glazing for the following elements and components as indicated on drawings:
 1. Glass to steel doors and screens of Section 081113; provide double-glazed sealed units with 6 mm tempered glass to each pane to all glazing in exterior doors and interior screens;
 2. Glass to wood doors of Section 081400 that are drawn or scheduled for glazing lites;
 5. Glass forming doors and panels of interior screen and demountable partitions, cut to suit patch fittings and all hardware where hardware is located within the glazing. All joints sealed. Note that Demountable partition system are N.I.C. by Owner's separate forces after completion of this Contract.
 6. All other glazing indicated on drawings and not described in other Sections.

In general, glass to aluminium screens, demountable partitions, and similar, shall be provided

by the supplier of the work for those components, to the standards and requirements identified in the applicable specification sections.

2. Provide glass to conditions indicated on drawings and to this Section, and at minimum.
 1. Ceramic glass: to all fire separation rated openings, to meet Ontario Building Code and NFPA 80 requirements and ULC or equivalent tests acceptable to the frame or door listing.
 2. Tempered glass: all interior and exterior doors and screens, except where rated in excess of 0 hour, in which case glass shall be ceramic glass.
 3. Provide glass thickness to a minimum as indicated. Where no thickness is indicated, provide 6 mm glass. Where glass must be thicker to ensure performance to referenced standards, to withstand nominated design loads, and where required by authorities having jurisdiction, provide such thicknesses as required to meet this performance. Note that where glass must perform the function of guard to meet OBC provisions for forces, this Contract requires that thicker glass be provided at no further cost to meet such performance in locations where glass forms the guard under the OBC.

3.5. Other Scheduled Interior Glazing:

1. At Frameless glass wherever indicated other than within demountable partition systems, provide anodized aluminium channels recessed into adjacent partitions, floors, and ceilings, sized to allow glass to slip up large channel and return into small channel on other side. Caulk with silicone.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

1. The Contractor is specifically cautioned that the Work requires achievement of the performance objectives for building systems described in Section 019010 and this Section. The Contractor shall organise the provision of the components of building systems to achieve the intent of the building system design, and shall provide all products and execution reasonably inferable as necessary to achieve the performance objective.
2. The Contractor shall perform the installation work to meet performance requirements for anticipated service life of the assemblies and shall provide the design of connections and fasteners as set out in Section 017010.
3. The Contractor shall thoroughly review all Sections of the specifications, and all drawings, to ensure that the requirements for execution of complete and functioning Interior Finishing Systems throughout the Work.
4. In general, interior finishing systems consist of the following components:
 1. coating systems, to interior surfaces, to form cured finishes to those substrates;
 2. applied finishes to substrates, such as carpet, tile, resilient flooring, or similar finishes;
 3. suspended ceiling systems in wallboard or as lay-in panels;
 4. Support elements and connections to the building structural system; and
 5. connections to adjacent systems.
5. Requirements for the components of the interior finishing system are additionally described in the following sections:

| | |
|---|----------------|
| 1. Indoor Air Quality Requirements | Section 018080 |
| 2. Metal Fabrications | Section 055000 |
| 3. Architectural Metal Fabrications | Section 057000 |
| 4. Rough Carpentry | Section 061000 |
| 5. Architectural Woodwork | Section 064000 |
| 6. Solid Surface Fabrications | Section 066100 |
| 7. Joint Protection | Section 079000 |
| 8. Steel Doors and Frames | Section 081113 |
| 9. Wood Doors | Section 081400 |
| 10. Hardware to Openings | Section 087000 |
| 11. Auto Door Operator and Related System | Section 087150 |
| 12. Glazing to Openings | Section 088000 |
| 13. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 14. Acoustical Ceiling Tile Systems | Section 095100 |
| 15. Carpet Tile | Section 096800 |
| 16. Wall Coverings | Section 097200 |
| 17. Painting and Coating | Section 099000 |
| 18. Installation of Building Signs | Section 101400 |
| 19. Demountable Partition Systems | Section 102219 |
| 20. Wall and Corner Guards | Section 102600 |
| 21. Installation of Owner-supplied Equipment | Section 110500 |
| 22. Window Shades | Section 125000 |
| 23. Window Films (N.I.C. by Owner's Forces) | Section 125250 |
| 24. Mechanical Devices Visible in the Finished Work | Division 21 |
| 25. Electrical Devices Visible in the Finished Work | Division 26 |

6. The following related systems and components of related systems provide inputs to and receive outputs from the Interior Finishing System. They are described elsewhere as noted:
 1. Building Structural System, providing structural support Section 019550
7. The Interior Finishing System indirectly affects the following systems described elsewhere:
 1. Fire Separation System Section 019522
 2. Barrier-Free Path of Travel System Section 019530

1.3. Definitions

1. *Interior Finishing System* is hereby defined as an interrelated set of assemblies of materials, components, and Products that are exposed to the indoor environment or ground, or that are separating spaces (or spaces and the ground) that create the finished environment for use of spaces. The performance requirements for components of the system may include (depending upon component) specific requirements for visual appearance, slip resistance, resistance to cleaning and maintenance practices, gloss and reflectivity, off-gassing in early facility life, expansion and contraction in response to environmental conditions, sound absorption, longterm wear and abuse-resistance characteristics.

1.4. System and Performance Intent

1. The intent of the Interior Finishing System is to achieve a co-ordinated set of finished surfaces that can support and respond to the use of the interior spaces over the life of the publicly used and intensively used building, without undue wear or deterioration, with resistance to this normal use, and that has the ability to be properly cleaned and maintained without degradation.
2. The Interior Finishing Systems may include the following, either singly or in combination:
 1. Ceiling Assemblies
 2. Flooring and Floor Coatings
 3. Finished Wall Surfaces
 4. Millwork and built-in items
 5. Accessories and Equipment
 6. Hardware, Equipment and Signs
 7. Finished surfaces of exposed Mechanical and Electrical devices

1.5. Pre-Installation Conferences

1. Schedule during initial phases of project start-up a meeting with the Consultant to review and consider the means and methods proposed by the Contractor for installation of the systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and Trade Contractors who will perform the work related to this system.

1.6. Sequencing

1. Plan and sequence work to permit installation of materials in conjunction with related materials so that the performance intent of the systems is achieved. Trades shall strictly conform to sequencing requirements for Interior Finishing Systems. Such requirements shall have primary precedence over all other construction sequences.

1.7. Submittals

1. Submit in accordance with Division 1 requirements and:
 1. Acknowledgement to Consultant's satisfaction of review of submittals of other systems as they relate to this system.

2. Submit lists of brands and product cut sheets showing conformance to specification standards for system components prior to confirming material orders.

1.8. Co-ordination

1. The construction superintendent shall review submittals of this and other work to ensure full understanding of the interrelation of components that will achieve the performance of the Interior Finishing Systems.
2. Inspection work and co-ordination work required to achieve the requirements of this Section are the responsibility of the Contractor's site superintendent and shall not be assigned to a trade contractor even if portions of the material installation work are so assigned.

1.9. Reference Standards and Codes

1. Ontario Building Code requirements for Resource Conservation and Environmental Separation.

1.10. Quality Control

1. Performance Requirements
 1. Coordination requirements as described in this Section.
 2. All finishes shall be installed, lapped, and joined to one another with due regard for their performance under variations in temperature and humidity. Finishes must be installed so as to conceal methods of fastening and to lap finishes for best performance where water may run across or down finish surfaces, and to form finish surfaces free of fasteners except where explicitly noted.
 3. Joints between finishes shall be caulked with sealant or otherwise made tight and impervious to water and cleaning operations.

1.11. Temporary Facilities, Safety Requirements and Environmental Protection

1. Conform and cooperate to ensure requirements for temporary facilities, safety, cleaning and waste management, and environment as set out in Section 016010 and Division 1 are achieved throughout the course of the Work. Provide an appropriate Interior Finishing System for the personnel performing work of this Contract, where required to ensure the safety of such personnel and building occupants.

1.12. Warranties

1. Notwithstanding warranty requirements of system products or components of the Interior Finishing System, the Contractor shall warrant the work and installations of the interior finishes in accordance with GC 12.3.1 and 12.3.4 for all connections between and among differing finish components.
2. Warranties shall not be voided by normal use associated with a public library and sportsplex.

1.13. Commissioning

1. Perform commissioning requirements in according with Division 1 requirements to ensure the proper function of components of the system, and the system.

1.14. Building Systems Requirements

1. In addition to the Fire Separation and Barrier-Free Path of Travel Systems, the work described by this Section is related to the other Building Systems as defined in Section 019010 and discussed elsewhere in this Section.

2. The Interior Finish System and its components shall be supported to the Building Structural System such that the support is permanent and incorporates all anticipated movement of the Structural System under live loads and occupancy conditions
3. Comply with requirements for performance, review, and co-ordination of such relations as set out in Division 1.

2. PRODUCTS AND EXECUTION

2.1. General

1. Products and Execution requirements for components of the Interior Finishing System are described in related sections and divisions of the specification, in schedules, and on drawings.
2. Execute work as described herein and to achieve performance.
3. Co-ordinate work described elsewhere in the Contract to ensure complete and continuous systems to achieve Ontario Building Code objectives for finishes and to achieve design intent for maintenance and longevity of finishes during normal use for which the spaces of the building are intended. Where sequencing of construction to achieve this goal requires multiple visits, partial installations, and integrated installations, then sequence and perform the Work as necessary with multiple trades working in close co-ordination.

2.2. Examination

1. Examine supports, substrates and work to other building systems to ensure conditions are satisfactory to achieve the performance standards for the work of this Section.
2. Commencement of the work shall imply acceptance of conditions.
3. Schedule installation of components in strict accordance with sequencing requirements to achieve performance and continuity of finishes behind finish components of other systems.

2.3. Installation of Components

1. Requirements for installation of products that form components of Interior Finishing Systems are described in related sections of the specification, in schedules, and on drawings.
2. Sequence the installation of systems and components for best finished appearance and durability, using concealed fastening and affixing methods.
3. Do not install finish devices of building systems until all surface finish systems are installed. Ensure devices are adjustable and fit smoothly and securely to substrate finishes. Where profiles of substrates are curved, provide intermediate trim fill to acceptance of Consultant in each case. Pay all costs for intermediate trim to join flat device surfaces to curved substrate finish surfaces.
4. Provide accessories and device trim colours and finishes to selection of Consultant. Note that device colours may vary throughout the work such that several colours or finishes are required, at no further cost to the Owner.
5. Provide changes in colour and finish between adjacent surfaces in the finished work, with all transition trim necessary for smooth and neat transition.

END OF SECTION

Not necessarily a Complete List. Provided to assist Bidders and Trade Contractors, and for reference purposes.

| SPECIFICATION SECTION | CODE | SPECIFICATION | REMARKS |
|---|----------------------|---|--|
| Section 064000 Architectural Woodwork | PLAM-1 | Plastic Laminate: Arborite no. P310-SR "Tatami Denimu" | See Millwork Drawings for Locations |
| | PLAM-2 | Plastic Laminate: Arborite no.P401-CA "Chambray Taupe" | See Millwork Drawings for Locations |
| Section 066100 Solid Surfaces | SSM-1 | Solid Surface Material no.1, Formica, Everform, no.758 "Bianco Mineral" | See Millwork Drawings for Locations. Provide with 1.5" D nosing |
| | SSM-2 | Solid Surface Material no.1, Formica, Everform, no.601 "Bleached Concrete" | See Millwork Drawings for Locations |
| Section 081113 Steel Doors & Frames | Frames | PT-3, as set out under Section 099000 below. To all interior steel door frames, semi-gloss finish, direct-to-metal paint Products | To Meeting Room(#220) |
| Section 081316 Aluminium Doors & Frames | Frames | To all interior Aluminum door frames and screens, pre-finished, colour to Owner's selection | To FP&AM Office Entry(#201A and 201C), Small Meeting Room(#208), HR Office Entry(#209A and 209B) and CP Office Entry(#206A) |
| Section 087000 Hardware | n/a | To Owner's Selection | As per the Hardware Schedule |
| Section 087150 Auto Door Operators | n/a | Clear Anodized Aluminium or Brushed Stainless, standard manufacturer colours | |
| Section 088000 Glazing to Openings | n/a | Clear glazing unless noted otherwise | where indicated or detailed. |
| Section 095100 Acoustical Ceilings | Suspension System | CGC or Armstrong: Nominal 2x4, Flat "White". Square Edge tiles. | To all Ceilings indicated as Lay-in-Panel (LAP) or Acoustical Ceilings (ACT) |
| Section 096500 Resilient Flooring | RBC | Rubber Base Cove – Tarkett Traditional Wall Base – DC283 Toast – 6" | to all rooms receiving resilient flooring, and where indicated on Finishes Plans |
| Section 096800 Carpet Tile | CPTT-1 | Interface:NY+LON Streets Collection, Mercer Street, 105768 Slate Circle | Field Carpet, Open Offices and Enclosed Offices |
| | CPTT-2 | Interface:NY+LON Streets Collection, Broome Street, 106214 Turquoise Glass | Accent Carpet, Enclosed Offices |
| Section 097200 Wall Coverings | VWC | As set out in Section 097200 | See Interior Elevations and Millwork Drawings for extent and locations |
| Section 099000 Painting and Coating | PT-1 | Aria DLX1001-2, by Dulux | Field Colour at Partitions |
| | PT-2 | Vining Ivy DLX1148-6, by Dulux | Accent Colour |
| | PT-3 | Black Magic DLX1001-7, by Dulux | Hollow metal doors and frames |
| Section 102219 Demountable Partition (N.I.C) | Frames | ALTOS Demountable Partition System: Pre- finished Aluminium metallic colour no. DPM69 "Black" | To Manager's Offices (#202, 203, 204, 211), Director's & Commissioner's Offices (#204, 216, 219) and HR Offices (#210, 211, 212, 213, 214, 215, 217, 218) |
| | Doors | Paint Colour to match aluminium frames | |
| | Glass | Double glazed, with outer glass textured equivalent to Pilkington Glass "Arctic". Inner glass pane to be clear tempered. | |

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Portions of the work described by this Section are subject to Itemized Pricing. Inspect the bid forms and provide all required Itemized Pricing to the bidding contractor. The bidding contractor shall provide all Provisional Pricing items to the Owner in the completed bid forms.

1.2. Related Requirements

- | | |
|--|---------------------------|
| 1. Work Related to Existing | Section 011030 |
| 2. Indoor Air Quality Requirements | Section 018080 |
| 3. Emergency Egress System | Section 019521 |
| 4. Fire Separation System | Section 019522 |
| 5. Metal Fabrications | Section 055000 |
| 6. Rough Carpentry | Section 061000 |
| 7. Architectural Woodwork | Section 064000 |
| 8. Solid Surface Fabrications | Section 066100 |
| 9. Joint Protection | Section 079000 |
| 10. Steel Doors and Frames | Section 081113 |
| 11. Glazing to Openings | Section 088000 |
| 12. Interior Finishing Systems | Section 090500 |
| 13. Acoustical Ceiling Tile Systems | Section 095100 |
| 14. Carpet Tile | Section 096800 |
| 15. Wallcoverings | Section 097200 |
| 16. Painting and Coating | Section 099000 |
| 17. Specialties | Division 10 |
| 18. Installation of Owner-Supplied Equipment | Section 110500 |
| 19. Access Doors | Divisions 20 and 26 |
| 20. Mechanical Systems (Grilles & Diffusers) | Division 20 & Mech. Docs. |
| 21. Lighting Systems | Division 26 & Elec. Docs. |
| 22. Telecommunications Systems | Division 27 & Elec. Docs. |
| 23. Security Systems | Division 28 & Elec. Docs. |

1.3. Definitions

1. The term *wallboard* where used in the Documents may refer to gypsum wall board (GWB) of industry standard density for interior use, cement board, tile-backer board, gypsum sheathing board (such as GP Densglass exterior sheathing or other sheathings), abuse-resistant gypsum wall board, water-resistant wall board or other panel product as the case and the specification may require. The Contract requires and includes that wallboard be selected in accordance with the partition, wall, and ceiling requirements as well as the finishes that will be applied to the panel products and the end use of the adjacent areas and environments.

1.4. Work Described by this Section

1. This Section describes working methods and standards of workmanship that must be provided in the application and installation of framing and panel products forming walls, partitions, ceilings, bulkheads and interior soffits, and similar elements in the Work.
2. **The work of the Contract includes all wallboard, as well as supplementary furring and non-loadbearing framing necessary to support wallboard materials. Such furring and framing is not shown on drawings. The Contractor shall supply all such furring and framing as necessary to support the panel material at maximum 16" (400 mm) on centre for partitions and walls (unless specifically otherwise noted), and at maximum 24" (600mm) on centre for ceilings and soffits. No further costs will be accepted by the Owner for products and**

installation required by this standard. Where framing members described in other sections form the support for panel work, supply and install appropriate supplementary framing to meet the spacing and support requirements set out herein.

3. Where support framing is specifically detailed, provide such framing and further framing as necessary to meet this specification. Not all required framing members, bracing, furring, and work are shown on drawings.

1.5. Reference Standards

1. Comply with requirements of CAN/CSA-A82.31-M91.
2. Canadian General Standards Board (CGSB)
 1. CAN/CGSB-71.25-M88, Adhesive, for Bonding to Framing and Metal Studs.
3. Underwriters Laboratories of Canada (ULC)
 1. CAN/ULC-S102-10, Building Materials and Assemblies, Standard Method of Test for Surface Burning Characteristics of Materials.
4. American Society for Testing and Materials (ASTM)
 1. ASTM A 653M-15e1, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 2. ASTM C 1047-09, Accessories for Wallboard and Veneer.

1.6. Quality Assurance

1. Work of this section must be performed by experienced drywall acoustic and lathing applicators or drywall finishers and plasterers having a minimum of 2 years experience in this type of work, and by a dedicated separate trade contracting firm with a ratio of experienced finishers to apprentices acceptable to the Consultant. Submit proof of qualification upon request. General labour forces of the Contractor may only perform work of this section if they have certificates of qualification as applicators.

1.7. Basic Product Requirements

1. Handle board and panel products to prevent damaged and broken edges.
2. Store materials in dry place so as to preserve their quality and fitness for work.
3. Fire Protection Requirements: The work of this Contract includes rated floor, ceiling and wall assemblies that are to be constructed in accordance with ULC and OBC requirements for such assemblies.

1.8. Basic Execution Requirements

1. Environmental Requirements
 1. Maintain temperature minimum 10°C, maximum 21°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. Apply board products after building has been completely enclosed and the environmental separation system substantially completed. Ensure that work to be concealed by gypsum board has been installed, tested, inspected and accepted before starting covering work.

4. Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.9. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended.

1.10. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:
 1. Emergency Egress System, to provide components of that system, as per Section 019521;
 2. Fire Separation System, to provide components of that system, as per Section 019522;
 3. The Barrier-Free Path of Travel System, to provide supports for devices of that System;
 4. Environmental Separation System, to repair provide components of that system
 5. Interior Finishes System, to provide components of that system, as described in Division 09 and in related Systems forming part of finish systems.

2. PRODUCTS

2.1. Framing, Furring and Trim

1. Unless otherwise specified, provide framing members of minimum 0.5 mm core thickness steel hot dip galvanized (wipe coat) to ASTM A563M-e1.
2. Studs, interior locations: channel shaped screw-on type: depth as indicated; with knurled supporting flanges at least 34 mm wide; with service pass-through holes at 610 mm o.c. in web. Provide minimum 0.9 mm thick studs where stud depth exceeds 92 mm.
3. Metal furring runners, hangers, tie wires, inserts, anchors: to CSA A82.30, galvanized.
4. Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
5. Top and bottom runners: channel sections, 35 mm legs and service pass-through holes at 610 mm o.c. Depth to suit studs.
6. Rough framing members: 38 x 13 x 1.2 mm and 19 x 13 x 1.2 mm galvanized steel channels.
7. Furring and strapping members to receive gypsum board: 19 mm deep channel shaped section with outstanding flanges and 35 mm wide knurled supporting face.
8. Casing beads, corner beads, control joints and edge trim: to ASTM C 1047-14a, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location. Note that transitions to lay-in panel ceiling grid systems at edge of bulkheads require (where height of bead and ceiling system align) a combination finishing bead and suspension system edge that is specified in Section 095100. Plastic not acceptable.
9. Hangers: minimum 3 mm galvanized steel wire.
10. Tie wire: minimum 1.5 mm soft annealed galvanized steel.
11. Metal control joint section: bellows shaped section with perforated flanges.

12. Reveal mouldings: extruded aluminum, profiles as indicated, by Fry, Pittcon or Gordon.

2.2. Board Material ("wallboard")

1. Minimum Standard for this Contract:
 1. 1/2" (13mm) standard grade gypsum wall board, unless noted otherwise in assembly types or required to achieve ratings.
 2. Use specifically indicated board for Type X (GWB) for ULC and fire-resistive assemblies only where abuse-resistant is not required to partitions. Where accepted that board need not be abuse-resistant, it shall be: to ASTM C 36 16 mm, regular and Type 'X', nominal 4'-0" (1,200mm) wide by maximum practical length, ends square cut, edges bevelled. Use of 1/2" (13 mm) for other than locations specifically identified in drawings and schedules is not permitted.
2. Abuse resistant board: standard board for partitions and wallboard where indicated on drawings or in assembly types shall be G-P Gypsum DensArmour Plus 16 mm Abuse-Resistant Interior Panel and Type 'X' where board is scheduled or indicated for gypsum wallboard. CertainTeed "Extreme Abuse", 16mm thickness, is acceptable equivalent. Where this product is proposed as an alternative for use as Type 'X' board in rated assemblies, it must additionally meet the requirements outlined in Section 019522 and tested for use in the ULC assemblies referenced in the Documents.
3. Water-resistant exterior sheathing board and roof underlay board: GP DensGlass Gold exterior sheathing, 13mm water resistant sheathing for exterior use, and where scheduled or indicated for interior use. CertainTeed GlasRoc Exterior Sheathing" is an acceptable equivalent. Where this product is proposed for use as roof underlay board it must be accepted by the Roofing Trade Contractor performing the Work of Section 075200 and meet performance requirements for Thermal Barrier Underlay Board identified in Section 075200.
4. Tile backer board: GP DensShield Fibreguard Tilebacker, 5/8" (16mm) water resistant, treated, mold resistant interior panel for wet areas, to all washrooms up to level of ceramic wall tile finishes, and where indicated for "tilebacker". CertainTeed "Diamond back Tilebacker" is acceptable equivalent.
5. Cement board: CGC Durock Next Gen cement board, for locations where board is scheduled or indicated for "cement board", and as substrate to manufacturer masonry veneer. CertainTeed "Permabase Cement board by National Gypsum" shall be acceptable equivalent.

2.3. Fastening and Finishing Materials

1. Resilient clips, drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of panel where requested on documents.
2. Nails: to ASTM C 514-04 (2014).
3. Fasteners shall be as recommended by panel manufacturers, and further as required for the particular substrate and framing condition. Fasteners to exterior and cement board in particular shall be cadmium and ceramic coated respectively.
4. Laminating compound: as recommended by board manufacturer for specific board and substrate, asbestos-free.
5. Transitions beads and edge trim: to ASTM C 1047-14a, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location. Note that transitions to lay-in panel ceiling grid systems at edge of bulkheads require (where height of bead and ceiling system align) a combination finishing bead and suspension system edge that is specified in Section 095100.
6. Sealants: to Section 079000, of single manufacture throughout the Work.

7. Taping materials: Paper tapes shall be used for base gwb panel work, but mesh tape shall be used for abuse-resistant, water-resistant, and exterior sheathing applications. Mesh tapes require the use of specific joint compound.
8. Joint compound: to ASTM C 475-15, asbestos-free, water resistant as recommended by board manufacturer for specific conditions of service, CGC or equivalent manufacture, and as follows:
 1. all-purpose, for taping and first coats;
 2. lightweight all-purpose, for second and finishing coats;
 2. quick-setting "hot" mix setting type compound for filling of larger joints, and for abuse-resistant, water-resistant, and exterior sheathing applications for taping and first coats;
 4. Mapei Plani-patch or similar cement-based leveling compound for cement board.
9. Bugle headed, ceramic, cadmium and coated fasteners, or as recommended by GP to be compatible with board material and substrate for the specific purpose. Upon request, submit written manufacturer's recommendations for the specific condition and materials.

2.4. Acoustical Materials

1. Acoustic Sealants: in strict accordance with requirements of Section 079000.
2. Acoustic Batt Insulation: Roxul Safe n Sound or equivalent, sized to fill cavity for 90 mm stud depths and 75 nominal thickness for 152 stud depths, unless otherwise noted.

2.5. Reglets and Panel Trim:

1. Provide galvanised steel edge bead and half-bead to all panel edges at reveals and reglets, to suit profiles.

3. EXECUTION

3.1. Metal Framing

1. General:
 1. Framing and furring indicated on drawings is schematic and shall not be considered exact or complete. Location and spacing of members, bracing, supports and securement shall be in accord with referenced standards as required to provide complete and finished work, and is included in the Work and Contract Price.
 2. Make provision for supporting recessed and surface mounted fixtures and equipment. Provide additional framing, supports and stiffeners as required, and at openings using wood studs, plywood, and other blocking necessary for the rigidity of the installation throughout anticipated conditions of service in the completed Work.
 3. Neatly frame around recessed fixtures and openings.
 4. Examine mechanical and electrical drawings and co-ordinate with Mechanical and Electrical Divisions to determine openings required.
2. Framing of Partitions (where not wood framed or framed with loadbearing light gauge steel framing as per Assembly Types):
 1. The trade contractor performing partition framing work is specifically cautioned that partitions require construction to capture and transfer structural loads imposed upon them, for distribution vertically and/or horizontally along the partitions to the structural system of building. Unless specified or shown otherwise, extend steel studs to underside of structural slab or deck above to supporting framing as detailed. Brace tops of all partitions against lateral loads.

2. All steel studs shall be spaced at 400 mm maximum, except where indicated otherwise.
 3. Install runner channels at top and bottom of partition and secure to supporting building elements at maximum 610 mm o.c.
 4. At partition corners extend one runner channel to end of corner and butt other runner channel, allow clearance for gypsum board thickness; do not mitre runner channels.
 5. Install steel studs vertically; fix studs to runner channels by crimping or screwing on both sides of stud.
 6. Install additional studs as detailed and required at partition intersections, openings and terminations at dissimilar materials. Place studs no more than 50 mm from abutting walls, openings and each side of corners. Provide double stud at door jambs.
 7. Stiffen partitions over 3.5 m in height at mid-height with at least one 19 mm horizontal bracing channel extending full length of partition.
 8. Provide slip joint at top of partitions to accommodate deflection of structure without casing damage to partition.
3. Ceilings and Soffits:
1. Erect suspension and furring system level with a maximum tolerance of ± 3 mm over a 3000 mm length. Use larger support members where detailed. Take note of details and structural system requirements and locations of recessed electrical.
 2. Suspension system shall support ceiling assemblies, with maximum deflection of $L/360$, L being span between supports.
 3. Hangers for suspended ceilings shall support grillage independent of walls, columns, pipe and ducts. Space hangers at maximum 1220 mm o.c. along rough furring members and not more than 150 mm from ends. Do not place hangers in front of access panels.
 4. Space rough furring members at maximum 915 mm and not more than 150 mm from perimeter walls.
 5. Space furring channels transverse to runner channels at maximum 6210 mm o.c. except at exterior soffits, and secure to each support with clip or saddle tie with 2 loops of tie wire. Install furring channels so as not to contact perimeter walls.
 6. Where ductwork, piping and other elements within ceiling spaces interfere with direction suspension of ceiling from structure, install additional framing securely fastening to main structure to accommodate proper hanging of ceiling.
4. Bulkheads, Coves, Furring
1. Frame to profiles shown, rigid, square, true to line and securely fastened to supporting building elements.
 2. Space furring members to receive gypsum board at maximum 610 mm o.c.
 3. Provide rough framing and bracing members as required to ensure stability and accuracy of work.
 4. Where indicated, provide resilient furring channels, spaced at maximum 600 mm o.c.

3.2. Furring and Final Preparation of Framing for Panels

1. Install work level to tolerance of 1:1200 and to written instructions of panel manufacturer for specific application and conditions of service.
2. Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, and grilles.
3. Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
4. Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
5. Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.
6. Furr openings and around built-in equipment, cabinets, and access panels on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
7. Furr duct shafts, beams, columns, pipes and exposed services where indicated.
8. Erect drywall resilient furring transversely across studs, spaced maximum 600 mm oc and not more than 150 mm from ceiling / wall juncture to all assemblies where specified. Secure to each support.

3.3. Board Preparations

1. Do not apply panel materials until bucks, anchors, blocking, vapour retarder, electrical and mechanical work are accepted.
2. Apply single and double layers as required to framing using manufacturer recommended fasteners. Maximum spacing of fasteners shall be 300 mm oc. along each framing support member, and more frequently where required by manufacturer.
3. Provide edge bead and reglet joint continuously around periphery of each face of partitioning to seal panel/structure junction where partitions abut exterior wall masonry. Seal full perimeter of cut-outs around electrical boxes, and ducts in partitions where perimeter is sealed with sealant and where partitions are in wet areas.
4. Do not install exterior sheathing boards until all structural framing including structural steel and loadbearing steel stud construction has been inspected and accepted by authorities, inspection and testing firms, Contractor's steel stud review engineer, and accepted by Consultant.

3.4. Installation of Boards

1. 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 o.c. using contact adhesive for full length.
2. Construct control joints of preformed units and support independently on both sides of joint.
3. Provide continuous polyethylene dust barrier behind and across control joints.
4. Locate control joints where indicated, at all changes in substrate construction, at approximate 10 m spacing on long corridor runs, and at approximate 15 m spacing on ceilings. Confirm locations with Consultant. All such joints are included in the Contract and Contract Price, regardless of whether indicated on drawings or not.
5. Install control joints straight and true.

6. Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
7. Install expansion joints straight and true.
8. Splice corners and intersections together and secure to each member with 3 screws.
9. Install access doors to electrical and mechanical fixtures specified in respective Sections.
10. Rigidly secure frames to furring or framing systems.
11. Finish face panel joints and internal angles with trim system installed according to manufacturer's directions.
12. Install reglets, edge bead, corner trim, control joints and other accessory trim as required with bull bed of sealant.

3.5. Moisture and Acoustic Control and Sealant Work

1. Provide sealant caulking at all panel edges each side as follows:
 1. At perimeter of partitions.
 2. Around objects penetrating partitions.
2. Caulk around objects such as electrical outlets, light switches, electrical and mechanical panels and boxes, grilles, and other objects penetrating. Caulk behind metal control joint sections.

3.6. Door Frames, Screens, Access Doors, Louvres, Vents, and Grilles

1. Install access doors supplied by Divisions 20 to 30 inclusive. Build doors into panel elements flush and parallel to walls and securely fastened. Position frames to relationships with panel material to acceptance of Consultant. Do not proceed in uncertainty.
2. Co-ordinate framing installation of steel door frames occurring in gypsum board partitions. Follow installation requirements specified in Section 081113.

3.7. Jointing and Compound Work

1. Deep filling shall be done with quick setting compound, 45 minute or quicker type.
2. Provide taping to all joints in first bed of joint compound, using type of compound specific to the board and tape. Use pre-mixed compounds for first coats only for base GWB wallboard installations, and use lightweight compound only for second and finish coats. Use site mix quick setting compounds for abuse-resistant, water-resistant and exterior sheathing board application taping and first coats.
2. Provide min. of 2 coat compound applications and further coats as required to achieve smooth level surfaces. Sand after coats, to provide smooth and complete partition, ceiling and soffit profiles for finishing. Do not oversand boards.
3. Surfaces to receive wall coverings shall be finished to standard necessary for wall covering installation.
4. Abuse-resistant, cement board, and water-resistant wallboard installations require quick setting "hot mud".
5. Water-resistant board applications require the use of reinforced fibreglass mesh tape, not paper tape.

6. Tilebacker board applications shall be taped ready for the work described in Section 093100 with taping products recommended by the tilebacker board manufacturer for the specific application.

3.8. Fire Rated Assemblies

1. Construct fire-rated assemblies where indicated to applicable ULC and OBC Supplementary Standard designs to achieve required ratings.
2. All wall board partitions require firestop sealant at perimeter where the assembly joins other material assemblies.
3. Provide furring, studwork, board, beads and trims necessary for the work of firestopping and to achieve ratings.

3.9. Reglets, Trims, and other Built-in Work

1. Build in work supplied by other Sections and all reglets, trim, and reveals shown on drawings.
2. Co-operate with rough and finish carpentry work, and architectural woodwork trade contractors to ensure blocking is installed and co-ordinated to all locations requiring such support, prior to installation of boardwork.
3. Co-ordinate sleeving and holing requirements and support requirements for mechanical and electrical devices and associated sealant work, firestopping work, and finishes work to such elements.

3.10. Sealant Work

1. Supply and install sealants in accordance with the requirements of Section 079000.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Related Requirements
 1. Work Related to Existing Building Section 011030
 2. Building Structural System Section 019550
 3. Rough Carpentry Section 061000
 4. Interior Finishing System Section 090500
 5. Non-loadbearing Studs and Boardwork Section 092000
 6. Wallcoverings Section 097200
 7. Mechanical fixtures and trim Mechanical Docs.
 8. Electrical fixtures and trim Electrical Docs.

1.2. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Duplicate full size samples of each type acoustical units and suspension systems.
 2. Submit one representative model of each type ceiling suspension system.

1.3. Co-ordination

1. Co-ordinate with Mechanical & Electrical for work to be built into the work of this Section. Note that mechanical equipment above ceilings requires specific access and maintenance clearances that require co-ordination between ceiling suspension members and equipment. This co-ordination must be performed PRIOR to any installation of mechanical equipment, by the construction of a rough site mockup of the conditions. The trade contractor performing work described by this Section shall cooperate with mechanical trade contractor and Contractor to ensure access to equipment for maintenance is maintained.

1.4. Reference Standards and Codes

1. Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.5. Quality Control

1. Comply with applicable requirements of ASTM C636M-13.
2. Maximum deflection: 1/360th of span to ASTM C635M-13a deflection test.

1.6. Basic Product Requirements

1. Store materials in work area 48 (forty-eight) hours prior to installation.

1.7. Basic Execution Requirements

1. Install acoustic ceilings only after building has been completely enclosed and after all construction operations that may expose the ceilings to dust, damage, or changes in humidity are complete. Conditions must be acceptable in the opinion of the Consultant, and HVAC systems must be operational to provide consistency to the interior environment.
2. Maintain uniform minimum temperature of 15°C and humidity of 20 - 40% before and during

installation.

3. Ensure that work to be concealed by acoustic ceilings has been installed, tested, inspected and accepted before starting work.

1.8. Maintenance Manuals and Materials

1. Provide in accordance with Division 1 requirements and:
 1. Extra materials of suspension system and 2 (two) full cartons of acoustical units for each type of unit installed in the finished Work.

1.9. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4, and further:
2. The Contractor and the Trade Contractor performing the work of this Section shall warrant the support and fastening of all components of ceiling grids and panels in accordance with GC12.3.1 and 12.3.4 but for three (3) years. All ceiling systems shall be tested for adequacy of support and fastenings with random commissioning test prior to final acceptance of the Work. Design and provide work to withstand minor movement of the grid without failure of tile support. All tiles lacking adequate support on all four sides shall be replaced.

1.10. Building Systems Requirements

1. The work described by this Section is a component of the Interior Finishes Building Systems. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.
2. The work described by this Section is related to the Building Structural System. The ceiling system installations must be supported from the Building Structural System and shall be braced to meet lateral forces anticipated by the structural design. Bracing is not shown within ceiling spaces, but is required.

2. PRODUCTS

- 2.1. Standard of acceptance is Armstrong World Industries Canada Ltd. Ultima High NRC Model 2083, or equivalent by CGC Interiors and Certain Teed Ceilings may be submitted for review but not be considered or accepted.

2.2. Suspension Systems

1. Suspension System for new Imperial Lay-in Acoustic Ceiling: Donn DX/DXL 15/16" standard suspension system for 2 by 4 tiles and:
 1. Main tees: 42mm x 23.8mm bulb section, minimum 0.5mm thick cold rolled galvanized steel. Main tee members shall be 3600mm long.
 2. Cross tees: 23.8mm wide, minimum 0.5mm thick cold rolled galvanized steel. Main tee members shall be 3.6m long; 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.
 3. Colour: flat white to areas receiving acoustic ceilings
2. Suspension System for existing Metric Lay-in Acoustic Ceiling: shall be existing system, refurbished and levelled to as-new condition.
3. Moldings and Trims:

1. for Lay-in Acoustic Ceiling ACT-1: 7/8" x 7/8" (22 x 22mm) by 3600 nominal length exposed face pre-finished galvanised steel wall moldings, flat white.
2. For all transitions from Lay-in suspension systems to adjacent gypsum wallboard ceilings in Lay-in Acoustic Ceiling, provide Donn transition moldings CPDWA9120.
4. Hanger wire: galvanized steel wire, minimum 3.6mm diameter.
5. Hanger inserts: purpose made. 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 proven through standard construction practices or by certified test data. Size devices for 3x calculated load supported except size direct pull-out concrete inserts for 5x calculated loads.
6. Accessories: splices, clips, wire ties, retainers and wall moulding reveal, to complement suspension system components, as recommended by system manufacturer.

2.3. Panels

1. Lay in Acoustical Ceiling shall be 2'-0" by 4'-0" (610mm by 1,220mm) Armstrong World Industries Canada Ltd. Ultima High NRC Model 2083, or equivalent by CGC Interiors and Certain Teed Ceilings may be submitted for review but not be considered or accepted.
2. Lay-in panels for existing metric format ceilings to remain shall be salvaged panels, free of defects, from the Select Demolition process. Remove and protect panels and turn over any existing excess panels requested by Owner.

3. EXECUTION

3.1. Examination, Scheduling, Supply Work, and Removals

1. Do not install ceiling suspension system, acoustical panels and tiles until work above ceiling has been reviewed and accepted by the Consultant.
2. Where structure or other exposed areas or ceiling areas are indicated or scheduled for paint finishes, do not install ceiling suspension system or any aspect of the system until completion and acceptance of painting work.
3. Examine all partitions, walls, and other surfaces to which the ceiling system is adjacent, and report any defects in plumb, true, squareness, or other defect requiring correction prior to beginning the ceiling installation work.
4. Supply ceiling planks to the trade contractor performing work of Section 098100, packaged new and without damage, in quantities suited to the requirements of that portion of the Work, including for reasonable waste and damage allowance.
5. Remove existing lay-in ceiling systems where required. Co-operate with other trade contractors to support devices and components of Building Systems that are to remain for re-installation in new ceiling systems. Dispose of all removed items and pay all disposal costs.

3.2. Ceiling Layout

1. Lay out ceilings to reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown install as directed by Consultant.
2. Finished work shall be plumb and square with adjoining work. The installation shall be level horizontal unless specifically shown for inclined installation. Use laser level methods throughout and examine all partitions and bulkheads for squareness and report any defects to Consultant.

3. Co-ordinate ceiling grid layout with access requirements for mechanical and other equipment and devices in the ceiling area BEFORE mechanical equipment is roughed in.

3.3. Installation of Suspension Systems

1. Installation shall be in accordance with ASTM C636 except where specified otherwise.
2. Install suspension system to manufacturer's instructions and certification organizations tested design requirements.
3. Secure hangers to overhead structure using attachment methods acceptable to Consultant.
4. Install hangers spaced at maximum 4'-0" (1,220mm) centres and within 6" (150mm) from ends of main tees.
5. Lay out according to reflected ceiling plan, from centre line of ceiling both ways, to provide balanced borders at perimeter with border units not less than 50% of standard unit width.
6. Ensure suspension system is co-ordinated with location of related components.
7. Install wall moulding to provide correct ceiling height and to suit adjacent wall substrates. Where partitions or walls are scheduled or shown for wall coverings install wall coverings prior to wall moldings.
8. Support at light fixtures and mechanical diffusers with additional ceiling suspension hangers within 6" (150mm) of each corner and at maximum 2'-0" (600mm) around perimeter of fixture.
9. Interlock cross member to main runner to provide rigid assembly.
10. Frame at openings for light fixtures, air diffusers.
11. Finished system shall be square with adjoining walls and level within 1:1000 unless shown for inclined installation.

3.4. Installation of Panels

1. Install panels in ceiling suspension system only after work within ceiling areas is complete, including mechanical system start-ups and verification of all components and systems present in the ceiling space.
2. Distribute variations in colour and texture of panels to obtain uniform appearance.
3. Install panels to form horizontal and level ceiling with all parts flush and joints butted tightly to hairline appearance.

3.5. Interface with Other Work

1. Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, and Owner's equipment, to be built into acoustical ceiling components.

3.6. Cleaning

1. After installation, clean and touch up minor surface defects on panels.
2. Remove damaged and marked units and replace with new unmarked Products just before handover of the Work for Owner occupancy.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|-------------------------------------|----------------------------------|
| 1. Work Related to Existing | Section 011030 |
| 2. Temporary Measures | Sections 015010, 015020 & 015030 |
| 3. Indoor Air Quality Requirements | Section 018080 |
| 4. Selective Demolition & Cleaning | Section 024119 |
| 5. Architectural Woodwork | Section 064000 |
| 6. Painting and Coatings | Section 099000 |
| 7. Electrical Systems (Floor Boxes) | To Division 26 and Elec. Docs. |
| 8. Telecommunications System | To Division 27 and Elec. Docs. |

1.3. Description of the Work

1. It is the intent of this section that all installation materials be low or zero V.O.C. and that materials will be installed according to the manufacturer's instructions.
2. Provide new carpet tile and base complete.

1.4. Submittals

1. Submit as described in Division 1:
 1. Submit two 300 mm x 300 mm (12" x 12") samples of carpet tile. Upon Consultant's request, submit full size carpet samples.
 2. Submit carpet tile layout to Consultant for review and acceptance prior to start of work. Show proposed layout of carpet tile jointwork and pattern orientation. Tiles shall be laid out based upon accepted carpet tile layout and pattern.
 3. Submit flooring manufacturer's installation manual containing acceptable substrate and environmental conditions for installation and that shall be maintained until handover of the finished Work to the Owner.

1.5. Quality Control

1. Install carpet tile after finishing Sections have completed their work and in coordination with work to wall bases.

1.6. Safety Requirements

1. Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

1.7. Basic Product Requirements

1. Delivery, Storage and Handling
 1. Deliver carpet to site in protective coverings.
 2. Store materials within building in a dry area having ambient temperature of at least 18°C for a period of at least 48 hours immediately before commencement of carpet installation.

2. Protection

1. Protect new carpet tile which will be subjected to construction traffic against damage, soiling and staining during installation period and thereafter until handover. Provide suitable drop sheets or reinforced paper coverings and tape joints to prevent shifting.

1.8. Indoor Air Quality Requirements

1. Requirements for VOC and other characteristics for Products and materials specified in this Section are additionally specified in Section 018080, Indoor Air Quality. Products must conform to these requirements and as follows:

1. All carpet systems must meet or exceed the requirements of the Carpet and Rug Institute's (CRI) Green Label Indoor Air Quality Test Program.

| Product | VOC Limit (g/L) |
|------------------------|-----------------|
| Indoor Carpet Adhesive | 50 |
| Carpet Pad Adhesive | 50 |

2. The maximum allowable carpet emissions of the CRI Green Label program are as follows:

1. Carpet Criteria

| Maximum Emission Factor | (measured in mg/m ² -h) |
|---|------------------------------------|
| Total Volatile Organic Compounds | 0.50 |
| 4-PC (4-Phenylcyclohexene) | 0.05 |
| Formaldehyde (to prove that none is used) | 0.05 |
| Styrene | 0.40 |

2. Cushion Criteria

| Maximum Emission Factor | (measured in mg/m ² -h) |
|----------------------------------|------------------------------------|
| Total Volatile Organic Compounds | 1.00 |
| BHT (butylated hydroxytoluene) | 0.30 |
| Formaldehyde | 0.05 |
| 4-PC (4-Phenylcyclohexene) | 0.05 |

3. Adhesive Criteria

| Maximum Emission Factor | (measured in mg/m ² -h) |
|----------------------------------|------------------------------------|
| Total Volatile Organic Compounds | 10.00 |
| Formaldehyde | 0.05 |
| 2-Ethyl-1-Hexanol | 3.00 |

1.9. Maintenance Manuals and Materials

1. Maintenance Manuals:

1. Submit operation and maintenance data as described in Division 1, and:

1. Maintenance Instructions shall contain maintenance program; cleaning procedures for regular, periodic, and immediate removal of all types of soil and stains; recommended cleaning materials, techniques and equipment, and recommendations for repairs.

2. Maintenance Materials

1. Supply to the Owner and obtain receipt for extra 5% of carpet tiles, in sealed original packaging. Extra carpet tiles shall be from same dye-lots as used for installation.

1.10. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4, and further:
 1. At no cost to Owner remedy any defects in work of this Section due to defects in materials and workmanship provided under this Section for a period equivalent to the manufacturer's standard material warranty from date of Substantial Performance, in accordance with GC12.3.1 and 12.3.4 as amended in this Section. This warranty is in addition to the material warranty under GC12.3.6, which shall additionally be provided by the Product manufacturer.
 2. Failure of seams, abnormal fading, de-lamination, unravelling, stretching, wrinkling, visible loss of surface pile and any other conditions detrimental to appearance or performance shall be deemed defects under the warranty provisions.

1.11. Building Systems Requirements

1. The work described by this Section is a component of the Interior Finishes Building System and the Barrier Free Path of Travel System. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.

2. PRODUCTS

2.1. Carpet Tile (CPTT)

1. Field Carpet Tile (CPTT1) shall be Interface NY_LON Streets Collection Mercer Street, 20" (50cm) by 20" (50cm) nominal, colour no. 105768 "Slate Circle", monolithic installation.
2. Accent Carpet Tile (CPTT2) shall be Interface NY_LON Streets Collection Broome Street, 20" (50cm) by 20" (50cm) nominal, colour no.106214 "Turquoise Glass", monolithic installation.

2.2. Other Materials

1. Wall Base: shall be resilient base to CAN/CSA-A126.5, Type 1, rubber. Colours to be matched with field carpet tile unless otherwise noted.
2. Adhesives: shall be low VOC in accordance with contract requirements for indoor air quality, and shall be selected in strict accordance with flooring manufacturers' written instructions for the specific floor and substrate.
3. Sealers, fillers, accessories: as recommended by carpet tile manufacturer and to meet Indoor Air Quality requirements.
4. Cementitious underlayment: Polymer modified quick setting cement based, as recommended by the floor manufacturer. Standard is Mapei Plani-patch. Gypsum based products are not acceptable.

- 2.3. Any equivalent proposed product will be evaluated during the bidding period and where accepted an addendum shall be issued. Alternatives submitted for equivalents must meet environmental compliance for VOC and off-gassing components of the product, have equivalent warranty, and otherwise meet this specification in order to be considered.

3. EXECUTION

3.1. Preparation

1. Prior to work inspect all substrates to scheduled to receive carpet tile and notify Consultant in

writing of any defects. Do not proceed until conditions are satisfactory. Start of work shall imply acceptance of conditions.

2. Substrates shall be clean and free of cracks and protrusions. Remove all dust and debris.
3. Prepare floor surfaces to receive glue down carpet in accordance with manufacturer's printed instructions.
4. Fill gaps, cracks & depressions with cementitious latex compound. Grind protrusions smooth.
5. Apply sealer to concrete substrates in accordance with sealer manufacturer's directions where concrete is to be sealed in accordance with carpet tile manufacturer's installation instructions.
6. Deliver carpet tile to place of installation only when environmental conditions in the Work have stabilized at temperatures and humidity ranges suitable for the service life of the Carpet. Loosen and unseal packaging and begin the off-gassing process. Ventilate the room in which the material is stored to assist the process.
7. Provide ventilation to the areas of installation to provide continuous exhaust once installations begin, to assist with the indoor air quality flushing requirements of the Contract.

3.2. Patching and Transitions

1. Where carpet tile flooring abuts other flooring of different thickness, provide cementitious underlayment allowing smooth and level transition between finished floor surface. Feather for at least 1 metre length for each 10 mm of difference.
2. Mix, apply and finish underlayment in accordance with manufacturer's instructions.

3.3. Carpet Tile Installation

1. Install carpet tile in accordance with material manufacturer's specific instruction for the conditions and substrates encountered.
2. Bond carpet to substrate with adhesive providing 100% contact. Roll out bubbles with suitable roller.
3. Installed carpet tile shall have smooth wearing surface free from conspicuous seams, burring, and other faults.
4. Ensure perfect colour pattern and texture to match within any one area. Maintain constant turn of tile direction.
5. Install tile tightly and fit neatly around architectural, mechanical, electrical and fitments, around perimeter of rooms into recesses and around fixtures, and around projections through the floor.
6. Work in and establish seam relationships in accordance with manufacturer's directions. Locate in accordance with reviewed and accepted layout.
7. Seal edges of cut-outs with latex, or use positive binding method.
8. Finish installation to present smooth wearing surface free from conspicuous seams, burring and other faults.
9. Install accent tiles within the field colour areas in accordance with drawings and Consultant instruction, at no further cost.

3.4. Carpet Base Installation

1. Provide carpet base at carpeted areas, 100 mm (4") high purpose-made base, matching carpet used for floor. Orient to each wall as instructed by the Consultant. Do not use tiles for base.

2. Install profiled J vinyl base cap to receive exposed top edge of carpet, adhered as recommended by the trim supplier, true and level.
3. Adhesive bond carpet base to wall, free of gaps and with top edge inserted in base cap.

3.5. Cleaning

1. Clean promptly as work progresses remove any excess adhesive with suitable solvent and to ensure that there are no deposits under the carpet installation as it progresses.
2. Immediately following installation, vacuum clean carpet; remove all loose pieces of face yarns with sharp scissors; remove adhesive spots and other stains in accordance with carpet manufacturer's recommendations. Establish seams for best performance and appearance.

3.6. Protection of Finished Work

1. Vacuum carpets clean immediately after completion of installation. Protect traffic areas. Prohibit traffic on carpet until adhesive is cured. Prohibit traffic on carpet by any workforce not involved in finishing trades. Provide protection for any other trade and for any process or portion of the Work that contains risk of damage to the installation, including but not limited to correction of deficiencies in ceiling and mechanical and electrical systems.

3.7. Ventilation

1. Continuously ventilate the spaces in which carpet is installed to assist the commissioning and Indoor Air Quality processes and Contract requirements for same.

3.8. Maintenance Instruction and Maintenance Materials

1. Instruct Owner's designated staff in the care and maintenance of the carpet tile, troubleshooting, stain removal, and replacement of tiles. Provide recommendations for furniture feet, chair castors and other furnishings that may be installed on the finished Work.
2. Provide maintenance materials in complete and re-sealed original packaging and obtain receipt from Owner. Submit the receipt to the Consultant.

END OF SECTION

1. GENERAL

1.1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

| | |
|--|------------------------------|
| 1. Architectural Woodwork | Section 064000 |
| 2. Joint Protection | Section 079000 |
| 3. Interior Finish Systems General Work Requirements | Section 090500 |
| 4. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 5. Acoustical Ceiling Tile Systems | Section 095100 |
| 6. Painting and Coating | Section 099000 |
| 7. Specialties | Division 10 |
| 8. Equipment | Division 11 |
| 9. Furnishings | Division 12 |
| 10. Mechanical | Divisions 20 and Mech. Docs. |
| 11. Electrical | Divisions 26 and Elec. Docs. |
| 12. Communications & Security Systems | Divisions 27 and 28 |

1.3. Submittals

1. Submit as described in Division 1:

1. Product Data:

1. Adhesives specifically recommended for the wallcovering applications, and product literature, setting out wallcovering manufacturer's written instructions for best installation practice for each product and application on this project.
2. Submit complete graphic shop drawing mockup, in colour, of the installation.
3. Certification of Flame Spread Rating & Smoke Development Index, demonstrating achievement of the requirements of Ontario Building Code..

2. Samples:

1. Submit duplicate 12" (600mm) by 24" (600mm) samples of full size scale of each graphic images, for Consultant's review and acceptance.
2. Before commencing application to partition or wall areas, prepare wall and apply sample wall covering to a section of partition, as mock-up for Owner's acceptance of finish and adhesion.

1.4. Reference Standards

1. Meet Type II requirements of CCC-W-408A through D, and CFFA-W-101A/B.
2. CGSB 41-GP-30M-82, Wall Coverings, Vinyl-Coated Fabrics.
3. Meet Ontario Building Code Smoke Development and Flame Spread Ratings.
 1. Maximum Flame Spread Rating of 150 permitted.
 2. Provide laboratory certification confirming construction flame spread and smoke index, when tested in accordance with the provisions of Standard Method of Test for Surface Burning Characteristics of Building Materials, except for methods of calculating flame spread rates. Provide Canadian equivalency for tests under the Ontario Building Code, and submit to Consultant and authority.

1.5. Quality Assurance

1. Standard of Care and Requirements is that no imperfection, differences in sheen, dirt or object entrapment, or change in colour, texture, or other defect can be seen from a distance of 5'-0" (1.5m) from the wall under any light condition including grazing. Consultant's determination is final. Make good all defects to this standard by removing coverings and installation of new coverings to whole surfaces such that they are refinished to even finish, with due regard for material dye lot sequence.
2. Given this standard of workmanship, the Trade Contractor performing work of this Section shall inspect and accept the substrate surfaces prior to beginning its work. Commencement of installation means acceptance of the substrate conditions.

1.6. Basic Execution Requirements

1. Temperature:
 1. Maintain air temperature and structural base temperature at wall covering installation area above 20°C for minimum 72 hours before, during and 48 hours after installation.

1.7. Indoor Air Quality Requirements

1. Requirements for VOC and other characteristics for Products and materials specified in this Section are additionally specified in Division 01 Section 018080, Indoor Air Quality. Products must conform to these requirements.
2. Supply Adhesives and Materials in accordance with indoor air quality requirements.
3. Ventilation
 1. Provide continuous ventilation during and after coating application.
 2. Following installation, ventilate area of work as directed by Consultant by use of approved portable supply and exhaust fans, to remove new material off-gassing to best extent.

1.8. Maintenance Manuals and Materials

1. Submit as described in Division 1.
 1. Maintenance Manuals:
 1. Full data of Masonry Stone Wall Textured Vinyl Wallpaper Product can be found in the in manufacturer's printed form. Manual for Large Format Digital Imagery is not required.
 2. Materials:
 1. Provide extra materials for vinyl wallpaper: 1 min. 6 m long full width piece for each colour and texture selected in the Work.

1.9. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended, and further:
 1. At no cost to Owner remedy any defects in work of this Section due to defects in materials and workmanship provided under this Section for a period of two years from the date of Substantial Performance of the Work, in accordance with GC12.3.1 and 12.3.4.
 2. Failure of seams, abnormal fading, de-lamination, bubbling, wrinkling, and any other

conditions detrimental to appearance or performance shall be considered a defect under the warranty provisions.

3. The Contractor and Product manufacturer shall additionally provide the wallcovering manufacturers standard warranty from date of Substantial Performance, 5 year, against product or material failure, in accordance with GC12.3.6.

1.10. Building Systems Requirements

1. The work described by this Section is a component of the Interior Finishes Building System. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.

2. PRODUCTS

2.1. Wall Covering and Fabrication

1. Large Format Digital Imagery

1. Wall coverings for large format digital images, shall be printed on 20oz. Commercial vinyl "Tabby", as supplied by Mural Unique, Contact Frank Baker t: (519) 831-7068 with the following images and locations:
 1. To corridor wall at Exit Stair, "Fir Forest" #1622.04, Length 9 m by full height of wall floor to ceiling.
 2. Alternative suppliers shall be considered during the bidding period through application to the Consultant and an addendum shall be issued where acceptable. Submissions must include proposed images that are equivalent to those selected herein.
 3. Alternative Vinyl products for digital printing of imagery, for greater resistance to moisture and cleaning, and having a more vibrant and saturated colouring to the images, may be considered during the bidding period through application to the Consultant and an addendum shall be issued where acceptable.

- 2.2. Adhesive: water-based curing lowest-VOC adhesive, as recommended by covering manufacturer for specific substrate. Note that adhesive for shop fabricated wallcovering shall be specific to the intended substrate and performance intent.

3. EXECUTION

3.1. Preparation

1. Deliver wall coverings when ventilation conditions are accelerated, and allow to acclimatise in installation area for 24 hours before application. Check to ensure that product is as accepted at submission stage and complies with Contract requirements. Check to ensure sequential production lots are supplied where multiple rolls are supplied.
2. Prepare surfaces according to covering manufacturer's instructions.
3. All work penetrating the partition, panel, or substrate shall be completed before installing coverings. All substrates shall be primed and prepared to VWC manufacturer's written instructions for best practice.
4. Seal and size surfaces to receive covering.

5. Wallcoverings shall not be installed with temporary pig-tail or inadequate lighting to the spaces, without exception. Where temporary lighting is required to facilitate the installation, it shall be in excess of light levels in the finished Work. Provision of all temporary lighting is included in the Work of this Contract, at no additional expense to Owner.

3.2. Installation

1. Apply adhesive in accordance with manufacturer's recommended rates of coverage. Do not over-apply. Completed installation with micro-perforated product shall be breathable.
2. Where instructed by the wallcovering manufacturer, "book" the wallcovering with applied adhesive for 15 minutes before hanging where recommended by manufacturer. Choose single adhesive to covering, or double to both surfaces, and wet or dry hang methods, as necessary for best finished installation and to recommendations of wallcovering manufacturer.
2. Install covering before installation of cabinetry, finish wood rails, specialties, and cover plates for devices of electrical systems.
3. Remove excess adhesive as work progresses and leave clean. Work to double cuts and seams shall be in accordance with best practice.
4. Leave completed work smooth, clean, without wrinkles, gaps, overlaps or air pockets.

3.3. Cleaning and Protection

1. Clean surfaces to covering manufacturer's printed instructions.
2. Protect finished surfaces and corners from damage until handover to Owner.
3. Damage caused by subsequent installation work to the surfaces or adjacent the surfaces shall be repaired or wallcovering installation replaced, at the Consultant's instruction, by the trade contractor performing the work of this Section. Repairs by other trade contractors or other forces will not be accepted. Contractor shall back-charge the applicable trade causing damage, or where this is indeterminate the Contractor shall provide the repairs and /or re-installation at its own cost.

3.4. Schedule of Wall Coverings:

1. Large Format Digital Imagery:
 1. To north wall of Corridor at Exit Stair. Install 9 metres by full height of wall.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated herein.
2. Portions of the work described by this Section are subject to Alternative Pricing and Itemized Pricing. Inspect the bid forms and provide all required Alternative Pricing and Itemized Pricing to the bidding contractor. The bidding contractor shall provide all Alternative Pricing and/or Itemized Pricing items to the Owner in the completed bid forms.
3. It is the intent of this specification to establish standards for paints and coatings, and to describe standards for installation. All trade contractors and the Contractor shall be mindful that paintings and coatings shall be shop prepared and shop applied wherever possible for components forming part of the Finish Systems.
4. Commencement of painting or coating application by the Contractor shall be deemed as Contractor's certification that the substrate has been prepared to the necessary standard to ensure coatings can provide finish characteristics required by the Quality provisions of this Contract. In particular:
 1. Finishes to architectural woodwork and wood finish carpentry described in Sections 062000 and 064000 shall be shop-applied and all such work shall be performed by the carpentry and woodwork trade contractor to the standard identified in this Section.
 2. The work of this Section includes staining and finishing edges, tops, and bottoms of wood doors to match door surface finish where finish is plastic laminate, and complete staining and finishing of doors where finish is selected as stain in Schedules.
 3. The work of this Section includes provision of paint finishes to all steel doors, frames and similar, wherever located in the Work. Opposite faces of doors shall receive different colours and finishes where noted, and different again from frames.

1.2. Related Requirements

- | | |
|--------------------------------------|---------------------------|
| 1. Indoor Air Quality | Section 018080 |
| 2. Selective Demolition | Section 024119 |
| 3. Metals Priming and Prep | Division 05 |
| 4. Architectural Woodwork | Section 064000 |
| 5. Joint Protection | Section 079000 |
| 6. Openings | Division 08 |
| 7. Non-Loadbearing Studs & Boardwork | Section 092000 |
| 8. Mechanical | Division 20 & Mech. Docs. |
| 9. Electrical | Division 26 & Elec. Docs. |

1.3. Submittals

1. Submit in accordance with Division 1:
 1. Product Information for all Paint and Coating Products in the Work.
 2. Submit minimum 8" by 10" ((200mm by 255mm) "architectural drawdowns", of each paint colour, type, and sheen proposed for use in accordance with Consultants' selection of colours and project requirements. Revise and resubmit as many times as may be required to ensure Consultant and/or Owner acceptance of draw-downs.
 3. Submit minimum 6" x 12" (150mm by 300mm) samples of wood stains on hardwood, to confirm stains to acceptance of Consultant.

4. Upon completion of Work, name and colour members of paint used, in form of a colour schedule in MS Excel format showing each room, for future reference and maintenance.

1.4. Work Schedule

1. Apply coatings only after all other Sections have completed their work.
2. Co-ordinate work of this Section with that of Section 079000 and review order of installation with Consultant where sealants are installed adjacent to painted surfaces.

1.5. Reference Codes and Standards

1. Master Painters Institute (MPI): Architectural Painting Specifications Manual, latest issue. All formulae must be "premium" or better.

1.6. Quality Assurance

1. Retain purchase orders, invoices and other documents to prove that all materials utilized in this contract meet requirements of the specifications. Produce documents when requested by Consultant.
2. Standard of Acceptance shall be top of line PPG Industries products, high performance water-borne acrylic and epoxy paints, except where otherwise noted herein for specific substrates. Standard of acceptance is PPG-Dulux Diamond for work to boardwork and AkzoNobel Devoc specialty coatings for other substrates.
3. Final coat to exhibit authenticity of colour, full coverage and protection in accordance with paint manufacturers' recommendations, and uniformity of sheen across full surface area.

1.7. Basic Product Requirements

1. Deliver and store materials in original containers, sealed, with labels intact.
2. Remove damaged, opened and rejected materials from site.
3. Provide and maintain dry, temperature controlled, secure storage.
4. Observe manufacturer's recommendations for storage and handling.
5. Store materials and supplies away from heat generating devices.
6. Store materials and equipment in a well-ventilated area with temperature range 7° to 30° C.
7. Store temperature sensitive products above minimum temperature as recommended by manufacturer, and in accordance with fire safety precautions.

1.8. Basic Execution Requirements

1. Environmental Conditions
 1. Maintain temperature in interior areas to receive coatings between 15° to 25° C for at least 24 hours before, during application and until coatings have cured after application. Apply exterior coatings only when temperature is above 10° C.
 2. Do not apply coatings under direct sunlight during hot weather.
 3. Adequately ventilate areas where coatings are being applied. Maintain a dust-free atmosphere for duration of coating work and setting of coatings.
2. Protection

1. Protect paint and painting equipment before use and during length of contract from climatic elements.
2. Protect other work from markings and other damage. Protect completed work from paint droppings. Use non-staining coverings.
3. Protect adjacent surfaces not scheduled to receive coatings from damage.
4. Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations. These items shall be carefully stored, cleaned and replaced on completion of work in each area. No solvent shall be used to clean hardware that will remove permanent lacquer finish on these items.
5. Mark labels and specification plates occurring on equipment to be painted.
6. Post "wet coating" and "no smoking" signs while work is in progress and while coatings are drying.
7. Keep oil rags, wastes and other combustible materials in closed metal containers and remove at end of each work day. Take every precaution to avoid spontaneous combustion.

1.9. Maintenance Materials

1. Upon completion of work provide one sealed and properly identified 4 L can of each type and colour of paint used on this project. Mark side of can with drawdown information.
2. Only top coating paints used in building interior are required for maintenance materials.

1.10. Warranties

1. In accordance with Division 1 requirements and GC12.3.1 and 12.3.4 as amended.

1.11. Indoor Air Quality

1. Conform with requirements as Indoor Air Quality Requirements 018080 and as follows.
 1. All paints and coatings that are applied onsite and fall within the building weather barrier must have a VOC content less than the limits of Green Seal Standards GS-11 and GC-03 and the State of California's South Coast Air Quality Management District (SCAQMD) Rule 1113. SCAQMD Rule 1113 has a revised edition dated February 5, 2016. All VOC contents limits for this Project are revised to that standard or better.
 2. The VOC content limits of Green Seal Standard GC-03 are as follows:

| Anti-Corrosive Paints | VOC Limit (g/L) |
|----------------------------------|------------------------|
| Anti-Corrosive Paint, Gloss | 250 |
| Anti-Corrosive Paint, Semi-Gloss | 250 |
| Anti-Corrosive Paint, Flat | 250 |

3. The VOC content limits of SCAQMD Rule 1113 are as follows:

| Coatings | VOC Limit (g/L) |
|-----------------------------------|------------------------|
| Bond Breaker | 350 |
| Clear Wood Finish, Varnish | 275 |
| Clear Wood Finish, Sanding Sealer | 275 |
| Clear Wood Finish, Lacquer | 275 |
| Clear Brushing Lacquer | 275 |
| Concrete-Curing Compound | 350 |
| Dry-Fog | 400 |
| Fire-Proofing Exterior Coating | 350 |

| | |
|---|-----|
| Fire-Retardant Coating, Clear | 650 |
| Fire-Retardant Coating, Pigmented | 350 |
| Flat Coating | 100 |
| Floor Coating | 50 |
| Industrial Maintenance Coating | 100 |
| High Temp. Industrial Maintenance Coating | 420 |
| Zinc-Rich Industrial Maintenance Coating | 100 |
| Japans/Faux Finishing Coating | 350 |
| Magnesite Cement Coating | 450 |
| Multi-Colour Coating | 250 |
| Non-Flat Coating | 50 |
| Pigmented Lacquer | 275 |
| Pre-Treatment Wash Primers | 420 |
| Primer, Sealer and Undercoating | 100 |
| Shellac, Clear | 730 |
| Shellac, Pigmented | 550 |
| Specialty Primer | 100 |
| Stains | 250 |
| Stains, Interior | 250 |
| Low-Solids Coating | 120 |

1.12. Identification of Building Systems

- The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:
 - Interior Finishes System, to provide components of the completed system of interior finishes.

2. PRODUCTS

2.1. Materials

- Paint materials to be PPG Industries products or equivalent by Sherwin-Williams or Benjamin Moore. Specific products shall be selected in accordance with MPI Manual, "Premium" formulae for each substrate and condition, and further
 - Direct-to-metal high performance water-borne epoxy semi-gloss for all metal substrates, AkzoNobel Devoe coatings formulated as recommended by manufacturer for specific substrate and service condition, or accepted equivalent.
 - Primer and finish coats high performance water-borne acrylics for interior boardworks, PPG-Dulux Diamond or accepted equivalent. Eggshell to ceilings, semi-gloss to walls, mid-gloss to doors and frames unless otherwise directed by Consultant. Review all glosses with Consultant prior to confirming paint orders, as part of the submission process.
 - Standard for epoxy wall coatings shall be PPG Aquapon WB EP Waterborne Epoxy Semi-Gloss Coating, or accepted equivalent.
- Paints shall be factory mixed unless otherwise specified, except any coating in paste or powder form, to be field-catalyzed shall be field-mixed in accordance with manufacturer's directions.
- Primers shall be as specified by the manufacturer and fully compatible with finish coats.

4. Primers for abuse-resistant board and Densboards shall be as for masonry block, block filler formulated to achieve complete coverage of board and joint surfaces so that jointwork and panel areas are indistinguishable from each other from any angle under any lighting condition.
5. Thinners, cleaners: as recommended by the paint manufacturer, and to Division 1 requirements for sustainability and VOC content.
6. Stains for wood shall be equivalent to Behr, Sherwin Williams, Benjamin Moore, PPG, or Minwax, low-voc, formulated to develop colour and appearance to match wood door plastic laminate selection, when applied to specified hardwood substrates. Submit duplicate sample(s) and adjust as required by Consultant. All stains for application whether in shops or onsite shall use the same formulation, regardless of multiple trade contractors.

2.2. Colours

1. Perform all colour tinting operations prior to delivery of paint to site, to match reviewed and accepted drawdowns.
2. Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.
3. The Owner may select colours from a full spectrum of colour. The work of this Contract includes all work to finish elements such as beams and structure in different colours than adjacent surfaces, including decking. At any change in surface the Owner may select a change in colour in the application.
4. At time of drawdown submission, identify any colour selection that may not appear in the finished work as per the drawdown because of the specific colour, finish coating product, and/or substrate or any relation among them. The Contractor is specifically cautioned that failure to achieve colour matches to drawdowns in the finished work will require further finish coats to achieve the selected colour without further cost to the Owner.

2.3. Finishes

1. Paint colours shall be generally as set out in the List of Interior Finishes and on Interior Elevations. However, further colours will be confirmed during construction. Owner reserves the right to choose several colours to the same wall surface, and different colours for individual system elements such as ducts or structures.
2. Contractor shall co-ordinate the bidding and work to ensure that exposed piping, ductwork and conduits except within mechanical and boiler rooms receives paint finishes unless specifically noted otherwise on drawings, by the Painting Trade Contractor.
3. Exposed piping, ductwork and conduits in mechanical and boiler rooms, and such systems elsewhere in and surrounding the building including rooftop, need not receive paint finishes unless specifically noted otherwise in documents or required by Code.

3. EXECUTION

3.1. General

1. Perform all painting operations in accordance with best practices of the MPI Architectural Painting Specifications Manual "Premium" systems except where specifically stated otherwise in the Contract.
2. Apply all paint and coating materials in accordance with paint manufacturer's written application instructions.

3.2. Preparation for Tasks

1. Ensure that workers are informed of safety rules.

3.3. Protection

1. Protect existing building surfaces not to be painted from paint spatters, markings and other damage. If damaged, clean and restore such surfaces as directed by Consultant.
2. Cover or mask floors, windows and other ornamental hardware adjacent to areas being painted to prevent damage and to protect from paint drops and splatters. Use non-staining coverings.

3.4. Cleaning

1. Cleaning described by this section shall be in addition to cleaning described in Section 024119, to a higher standard for all existing and new elements and surfaces to receive paint finishes.
2. Clean all surfaces to be painted, whether existing or new, as follows:
 1. Remove all dust, dirt, and other surface debris by wiping with dry, clean cloth.
 2. Wash surfaces with solution of cleaners that do not leave residue, and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 3. Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface and no residue remains.
 4. Allow surfaces to drain completely and allow to dry thoroughly before coating.
3. Prevent contamination of cleaned surfaces before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
4. Cooperate with other trades for items to be pre-painted prior to installation.
 1. All door edges must be finished immediately that doors arrive to site.

5. Conditions of Substrates

1. Sound, non-dusting, and free of grease, oil dirt, and other matter detrimental to adhesion and appearance of coatings. Commencement of finishing means acceptance of conditions.
2. Temperature minimum 15° C.
3. Moisture content: maximum 12%. Test for moisture content using moisture meter.
4. Alkalinity: test cementitious substrates for alkalinity. Use method recommended by coating manufacturer.

6. Surface Preparation - General

1. Prepare and ensure preparation by other trades of each substrate of following materials according to listed painting standards.
2. Where possible, prime all surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
3. Follow related recommendations on surface preparation methods in OPCA Guide to paint specifications.
4. Surface preparation methods and tools to be used are to be agreed by Owner and supplier of Product to be painted.

7. Preparation of Substrates - Specific

1. All substrates: clean as required to produce an acceptable surface. If wood, metal or any other surface to be finished cannot be put in proper condition for finishing by cleaning, sanding and filling as specified, notify Consultant in writing or assume responsibility or rectify any unsatisfactory finish resulting.
2. Wood generally: clean soiled surfaces, sand smooth and dust off; putty nail holes, splits, scratches, after prime coat has been applied and dried; colour putty to match finish; putty stained wood after stain application.
3. Wood for paint: clean knots, pitch streaks and sappy sections of residue and seal with sealer before applying prime coat.
4. Stain and clear finish to woods shall be as described in Section 062000. Co-ordinate shop and field prep with trades providing benches and other wood items for clear or stained finishes.
5. Bare ferrous metal: remove rust and scale; wash with solvent; chemically clean; apply coat of direct-to-metal finish as primer.
6. Previously primed metal: remove rust, oil, grease and loose shop paint by washing or wire brushing; make good shop coat; ensure shop coat is direct-to-metal in accordance with this Section. If confirmed, feather out edges of touch-up. If shop coat is other, obtain Consultant's review and acceptance of condition of substrate to receive new direct-to-metal finish as primer, and provide a full coat of such finish, as primer, at no cost to Owner. Contractor and Painting Trade Contractor shall reconcile and the supplier of the faulty material shall be back-charged.
7. Zinc-coated metal: wash and etch to dull paint receptive surface using an approved crystalline zinc phosphate or vinyl pretreatment.
8. Hot dip galvanized steel: vinyl wash prime unless not recommended by finish coat paint manufacturer, in writing.
9. Unit masonry and concrete: fill minor cracks, holes and fissures with Polyfilla and smooth to a flush surface. Texture filled areas to match surrounding surface.
10. Gypsum board: fill minor cracks, holes and fissures with patching plaster, and smooth to a flush surface; sand taped joints and remove dust.
11. Alkaline surfaces: wash and neutralize using proper type of solution compatible with paint to be used.

8. Spot Priming and Sealing

1. Spot prime knots and resinous areas of wood to standards of CPCA manual, whether existing or new. All knot and resin areas of wood to receive new paint finishes must not bleed such markings through new finishes.

9. Paint Application

1. Apply paint by spray or roller methods except where not practical because of protection or masking difficulties.
2. Roller or brush painting may be permitted where deemed advantageous and shall be subject to Consultant's acceptance. Provide spray application as the norm, using only

airless spray guns. Consultant may prohibit use of spray painting at any time for such reasons as carelessness, poor masking or protective measures, drifting paint fog, disturbance to other trades or failure to obtain a uniform satisfactory finish.

3. Brush application shall be kept to a minimum:
 1. Work paint into cracks, crevices and corners.
 2. Brush out runs and sags.
 3. Remove runs, sags and brush marks from finished work and repaint.
4. Standard of Care and Coating Requirements is that no flashing, differences in sheen, dust entrapment, or change in colour, texture, or sheen can be seen under any light condition including grazing from a distance of 1.5 m. Consultant's determination is final. Make good all defects to this standard by providing further preparation, sanding, and coatings to entire areas. Touch ups of spackling and boardwork must be re-primed and whole surfaces refinished to even finish.
 1. Apply each coat of paint as a continuous film of uniform thickness.
 2. Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
 3. Applied and cured coats of paint shall be uniform thickness, sheen, colour and texture and free from brush or roller marks, sags, crawls and other defects detrimental to appearance and performance. Repaint thin spots or bare areas before next coat of paint is applied.
 4. Regardless of the number of coats specified for any surface, apply sufficient paint for primer, intermediate and finish coats.
 5. Thoroughly mix materials before application.
 6. Where two or more coats of same paint are to be applied, undercoats shall be tinted in lighter shades of final coat to differentiate from final coat.
 7. Finish tops of projecting ledges, both above and below sight lines as specified for surrounding surfaces.
 8. Finish top, bottom, edges and cutouts of doors after fitting.
 9. Touch up suction spots after application of first coat.
 10. Sand and dust between each coat to remove visible defects.
 11. Each coat of finish shall be dry and hard before succeeding coats are applied with a minimum of 24 hours between coats, unless manufacturer's instructions state otherwise. Do not proceed with coat where the preceding coat has been found unacceptable by the Consultant until remedial measures are agreed and performed.
 12. Stained woodwork shall be covered with a uniform coat of stain and wiped off if required. Wood shall have a uniform shade. Match stain so that dissimilar woods have uniform finished appearance.
10. Work to Existing Building
 1. Prep and coat existing surfaces, elements, and substrates after re-priming and preparation in accordance with MPI manual for best adhesion and quality of finish.
 2. Inspect existing surfaces in the Facility that are to receive new finishes and report any defects to the Consultant and Contractor. Commencement of coatings applications shall be

deemed acceptance that coatings performance and quality shall be as for new work and substrates.

11. Protection of Completed Work

1. Protect areas where paint has been applied from possible contamination caused by surrounding environment and also from passing pedestrian traffic, visiting public and other trade activities. Avoid scuffing newly applied paint.
2. On completion of specified work remove surplus materials, tools and equipment and debris on work area; leave clean and tidy to complete satisfaction of Consultant.

12. Schedule of Finishes:

1. General Requirements

1. Paint or otherwise finish surfaces of building materials, building surfaces and building accessories not otherwise protected or covered, as shown on Finish and Door Schedules, drawings, and as selected by Owner from full colour spectrum. Owner may choose further and different colours for structure and other systems elements than general surface substrates, and may choose several colours for general surface substrates.
2. In addition to finishing required by Room Finish and Door Schedules, Drawings and these specifications, and unless otherwise specified, all new work which is exposed to view and which is not prefinished shall be finished by this section.
3. In areas specifically designed as "unfinished" painting is not required except for bare, primed and zinc coated metal surfaces (including structural columns and beams) and insulated ductwork and pipe, which shall be finish painted.
4. Where exposed to view paint bare metals, previously primed metals and zinc coated metals unless specified otherwise.
5. Paint behind surface mounted fixtures on walls and ceilings with full coats of paint.
6. Paint inside surfaces of light coves white.
7. Finish tops and bottoms of doors, trim, projections and other work as specified for surrounding work whether above sight lines or not.
8. Finish edges of doors to match face of door. Refinish edges of doors after fitting.
9. Paint tops, bottoms and edges of storage shelves with full specified coats, whether exposed to view or not.
10. Paint interior of ducts at grilles and diffusers with two coats of flat black paint, so that duct interior is not visible when grilles and diffusers are installed.
11. Paint piping, ducts, and conduits in areas and rooms where such elements are exposed in the finished work. Except for Mechanical and other service rooms, use colours matching background wall or ceiling colours, unless otherwise directed by the Consultant. For Mechanical Rooms and service rooms, paint in accordance with the Owner's requirements for piping, duct, and conduit colours. Identification marking shall be performed by the Trade Contractor installing the building system of which the element forms part.
12. Unless specifically indicated to be painted, all finish carpentry work shall receive a stained and transparent finish by Section 062000 and Section 064000, except any open

storage shelves, which shall receive opaque colour paint finish by this Trade Contractor.

13. Unless specifically indicated otherwise paint all rooftop equipment and components, regardless of material and finish, including but not necessarily limited to mechanical rooftop equipment, vent stack flashings, sleeve flashings window washing anchors, but not including prefinished sheet steel flashings.
14. Where finishing formula for surfaces requiring painting is not included hereunder, follow recommendations of Canadian Painting Contractor's Association Architectural Painting Specification Manual, latest issue.
2. Specific Finishes (not a complete list, see also room finish schedules and Other Sections)
 1. As described in the Finish Schedules, and on drawings.
 2. Pre-paint ventilation grilles prior to installation where not prefinished. Devco coatings semi-gloss. Spray application only.
 3. Paint hollow metal doors and frames unless prefinished. Devco Coatings. Brush or roller acceptable only where finished product is without brush or roller marks. Otherwise mask and spray.
 4. Paint wood doors and frames, except new prefinished door surfaces. Devcoat. Brush or roller acceptable only where finished product is without brush or roller marks. Otherwise mask and spray.
 5. Paint new and/or existing concrete block and masonry partitions and walls exposed to the interior in the finished work. Waterborne Epoxy Semi-Gloss Coating. Use spray application only. Apply two coats block filler to acceptance of Consultant prior to application of finished coats.
 6. Paint all new soffits and ceilings. Glidden Diamond 350 eggshell except where finish schedules indicate Epoxy Paint. Epoxy paint shall be PPG Aquapon WB EP Waterborne Epoxy Semi-Gloss Coating or accepted equivalent.
 7. Paint new partitions. Glidden Diamond Satin, except where finish schedules indicate Epoxy Paint. Epoxy paint shall be PPG Aquapon WB EP Waterborne Epoxy Semi-Gloss Coating or accepted equivalent.
 8. Paint all exposed conduit, ducts and piping in the exposed work, unless pre-finished.
 9. Paint all piping insulation exposed in the finished Work.
 10. Stain and finish all wood door edges (p lam finished doors) and stain and finish all wood veneer doors wherever present in the Work. Doors shall be stained and finished immediately upon delivery to site so that manufacturer's warranty is not affected.
 11. Stain millwork, trim, sill woodwork and other elements in shop wherever possible. All such work shall be performed by the woodwork trade contractor and finish carpenter, to the standards of this Section and Sections 062000 and 064000.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated herein.

1.2. Related Requirements

- | | |
|--------------------------------------|----------------|
| 1. Cash Allowances | Division 01 |
| 2. Existing Conditions | Division 01 |
| 3. Rough Carpentry | Section 061000 |
| 4. Steel Doors and Frames | Section 081113 |
| 5. Wood Doors | Section 081400 |
| 6. Glazing to Openings | Section 088000 |
| 7. Interior Finishes System | Section 090500 |
| 8. Non-loadbearing Studs & Boardwork | Section 092000 |
| 9. Wall Coverings | Section 097200 |
| 10. Painting and Coatings | Section 099000 |
| 11. Demountable Partitions | Section 102219 |

1.3. Cash Allowance

1. Types of building signage are as specified below. For the purposes of this Contract, the material supply cost of the building signs shall be as defined in Section 012020, Cash Allowances. Installation of building signs, including blocking and rough-in requirements, is included in the Work and the Contract Amount, but not in the Material Supply Allowance. Perform all work required to install accessories in accordance with Contract requirements, at no further cost to Owner.
2. Building signage other than as specified herein shall be supplied by the Owner at Owner's cost, not in Contract, and not from any material supply allowance. Owner retains the right to purchase other signage using cash allowances where allowances are not fully expended.

1.4. Supply of Signs

1. Room and Door Signs, by this Section.
2. Equipment identification signage is described in Mechanical and Electrical, and shall be performed as described therein, by the trade undertaking such Section without further expense to Owner.
3. Opaque films required by barrier-free provisions of the Code to full height glazed panels, shall be supplied and installed by the trade undertaking such Section, without further expense to the Owner, and not by the Cash Allowance.
4. Installation of Graphic Insert Holders is included in the Contract, and not the supply allowance. Supply of the graphic inserts within such holders is by the Owner, n.i.c. or by Cash Allowance expenditure.

1.5. Submittals

1. Contractor shall obtain submittals from Owner nominated supplier(s) of building signage, and shall submit in accordance with Division 1 requirements.
2. Submit fabrication drawings.

1.7. Building Systems Requirements

1. The work described by this Section is a component of the Emergency Egress System, the Barrier-free Path-of-travel System, and the Interior Finishes Building Systems. Comply with requirements for the

integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.

2. PRODUCTS

2.1. General

1. Signs may include some or all of the following:
 1. Identification & Wayfinding Signage
 2. Administrative Signage
 3. Administration Sign Holders
 4. Warning and Alarm Signage
2. Fastening: sign-grade double-sided adhesive tape, Tesa 51970 or 3M automotive panel trim adhesive tape. No substitutions permitted.

2.2. Schedule of Specific Building Signs

1. In addition to the general signs indicated above, the Contract includes the following specific building signs to be supplied by cash allowance, to be installed under this contract:
 1. Room Identification Signage: allow for installation of up to 20 signs for adhesive fastening.
 2. Owner's graphics for application to glass or other surfaces are not in contract and shall be performed by Owner's nominated forces after handover of the Work.
 3. Owner's graphic films for application to glass or other surfaces are not in contract and shall be performed by Owner's nominated forces after handover of the Work.

3. EXECUTION

3.1. General

1. Erect and secure signs plumb and level at elevations and locations as directed onsite by Consultant.
2. Comply with sign manufacturer's installation instructions.
3. Do not install signs until all finishing work is complete and cured.

3.2. Aluminium Sign-holders

1. Use self-stick adhesive sign-grade Tesa tape to manufacturer's instructions to adequately fix sign and prevent "rocking". Keep tape maximum 1.5 mm from edges.
2. Install sign-holders at heights and in locations of Owner's choosing, to a variety of substrates. Ensure install heights conform to requirements of Authorities for accessibility. Such requirements shall govern over Owner's instructions no exceptions.

3.3. Door and Room Signs

1. Use self-stick adhesive sign-grade tape to manufacturer's instructions to adequately fix sign and prevent "rocking". Keep tape maximum 1.5 mm from edges.
2. Install door signs to requirements of AODA requirements and best practice.
3. Do not drill doors under any circumstance.

4. The Contractor shall allow for the installation of a room or door identification at the rate of one per door for every door in the Work, at no cost to Owner.
 1. Allow for 20(twenty) officesand meeting rooms identification signs to be installed.
5. The Contractor shall allow for the installation of way-finding signage at key locations throughout the fit-up, mounted to partitions, as follows, at no cost to Owner.
 1. Allow for 10 (ten) way-finding signs to be installed.

3.4. Cleaning and Protection

1. Leave signs clean. Remove debris and dispose of any adhesive backing strips.
2. Protect signs until handover of Work. Replace units with any damaged finishes.

END OF SECTION

1. GENERAL

1.1 General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Prefabricated interior specialty items shall be supplied complete by Division 1 Cash Allowance.

1.2 Related Sections

- | | |
|---|--|
| 1. Cash and Contingency Allowances | Section 012020 |
| 2. Metal Fabrications | Section 055000 |
| 3. Rough Carpentry | Section 061000 |
| 4. Joint Protection | Section 079000 |
| 5. Glazing to Openings | Section 088000 |
| 6. Interior Finishes System | Section 090500 |
| 7. Finishes to Walls, Floors | Division 09 |
| 8. Specialties | Division 10 |
| 9. Mechanical Work | Division 20, 21 & Mechanical Documents |
| 10. Electrical Work | Divisions 26 & Electrical Documents |
| 11. Communications Work | Division 27 |
| 12. Electronic Safety and Security Work | Division 28 |

1.3 Submittals

1. Shop Drawings: Submit Shop Drawings in accordance with Section 013030.
2. Product Data: Submit manufacturer's data sheets for each product specified, including:
 1. Installation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Replacement parts information.
 4. Rough opening requirements
 5. Physical dimensions
 6. Front elevation of mailboxes, including suite numbers and font size.
 7. Lead time for Supply of Items to the Project
 8. For mailbox units, documentation demonstrating compliance with 'Delivery Planning Standards Manual for Builders and Developers' prepared by Canada Post.

1.4 Maintenance Manuals and Materials

1. Submit as described in Division 1:
 1. Provide operation and maintenance data for accessories for incorporation into manual.
 2. Maintenance Materials: Provide special tools required for accessing, assembly/disassembly or removal for specialties. Deliver special tools to Owner's representative. Do not under any circumstances leave such items attached to accessories or otherwise "left at jobsite".

1.5 Quality Assurance

1. Installation work for products of this section shall be undertaken by finish carpenters acceptable to the Consultant and Owner.
2. The Contractor shall co-ordinate and ensure placement of blocking by rough carpentry, to provide solid support to specialties, as described in Section 061000.

3. To greatest extent possible, provide Products from a single manufacturer. All Products shall be from acceptable manufacturers list in this Section. Co-ordinate access doors with doors provided by all Trade Contractors.
4. Forces supplying and installing specialties must be fully conversant with present OADA and Building Code standards for mounting and position of all items, and access requirements for items which access doors serve.
5. Basis of design are the Products listed. Alternative Products may be supplied from list of acceptable manufacturers only where such manufacturers meet or exceed the specified requirements or the characteristics of the base spec item.

1.6 Warranties

1. Warrant installation work and sufficiency of blocking for Owner-installed Products in accordance with the Contract General Requirements, GC12.3.1 and 12.3.4.
2. All Products supplied under this Section shall be warranted directly by manufacturers to the Owner in accordance with GC12.3.6. Contractor shall solicit and obtain all warranties.

2. PRODUCTS

2.1. Materials and Products (by Material Supply Cash Allowance in Division 1)

1. Fasteners: Obtain and pay for all fasteners for products and materials as recommended by the supplier and manufacturer of the item, to match the specific fastening condition. Robertson head cadmium-coated concealed screws, tamperproof exposed fasteners, exposed fasteners to match holing bevels for face of unit and stainless steel. Expansion shields: fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use. Cup washers and/or mismatched fasteners shall not be used. General duty fasteners and fasteners not intended for exposed locations shall not be used. Obtain from accessories supplier in appropriate lengths and finishes for specific conditions.
2. Provide new Products and materials in perfect condition, free from defects impairing strength, durability or appearance.
3. Refer to the Architectural plans and notes to this Section for location and required quantity of items specified. Not all items are shown on drawings, but are required.
4. Manufacturer's or brand names on face of units are not acceptable.

3. EXECUTION

3.1 General

1. Fabricate Products in shop only, and ship to site complete. Supply of anchors and fasteners shall meet the requirements of Division 1 Execution, for the specific substrate and conditions for each item. Where anchors and fasteners are supplied generically, they shall not be acceptable for use in this Project. All fastening and anchoring shall be purpose-designed and concealed completely in the finished Work excepting only Products specified for exposed fastening, able to withstand the conditions of service that can be reasonably expected in the Facility.
2. Supply Products and materials to site and store in compliance with manufacturer's instructions. Protect all accessories and do not install until adjacent work has been completed and accepted.
3. Photograph the roughed in blocking and elevations of all walls and ceilings at the rough-in stage, to record presence of blocking. Call for Consultant review of blocking once completed and prior to covering.

4. Supply inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts for each condition in the Work.
5. Install access panels only to agreed locations during layout phase and prior to system pathway rough-ins.

3.2 Examinations

1. Report to the Consultant, in writing, all defects of work prepared by other trades and on unsatisfactory site conditions.
2. Do not commence the work of this Division until surfaces, area, conditions specified or indicated on drawings, to receive manufactured specialties, are compatible with the manufacturer's installation requirements.
3. Commencement of work implies total acceptance of all preliminary installation requirements by the Contractor installing manufactured specialty items.
4. Waive any after claims by failure to comply with the above procedure of examination.

3.3 Installation

1. Carry out installation of manufactured specialty items by tradesmen with the necessary training and experience, and certified by the manufacturer or by the Contractor.
2. Conform to manufacturer's printed installation instructions and/or shop drawings.
3. Install and secure accessories rigidly in place for permanent concealed mounting wherever possible.
4. Do not install items until layout has been established and temporarily marked on wall for approval of building inspector and Owner.
5. Install specialties plumb, level, and true, and in accordance with manufacturer's shop drawing and reviewed and accepted Submittals. Set recessed and semi-recessed accessories in bedding surround with kitchen-grade silicone sealant to quality requirements of Section 079000. Remove excess sealant to form concealed seal.
6. Installation includes the following:
 1. Verify blocking has been installed properly.
 2. Verify location does not interfere with door swings or use of fixtures.
 3. Comply with manufacturer's recommendations for backing and proper support, where more stringent than this Section.
 4. Use fasteners and anchors suitable for substrate and project conditions, to acceptance of Consultant.
 5. Conceal evidence of drilling, cutting, and fitting.
 6. Test for proper operation and commission in accordance with Division 1 requirements where the unit forms part of a Building System.

3.4 Maintenance Materials

1. Provide special keys or tools required for operation of accessories, with spare sets, directly to Owner's representative and obtain receipt. Tools and keys "left in [or top of] the accessory" are not acceptable, and shall be promptly replaced at Contractor's cost.

3.5 Cleaning And Protection

1. Be responsible for protection of all manufactured specialty work during period of construction.

2. Upon completion of installation of all manufactured specialty items remove all excess material, empty cartons, wrappings, etc. and remove any dirt spots and foreign material from the installed items, leaving them in a clean, usable condition.
3. Upon the completion of installation work, remove from the site all surplus materials and debris caused by this work and leave the site in a clean condition to the satisfaction of the Consultant.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. The Owner's forces performing the work of this Section shall comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. **The work described by this Section is Not In Contract. It shall be provided as a subsequent phase of the project during installation of Fixturing, Fittings, and Equipment, by the Owner's direct contract to the Owner's nominated vendor of record for the demountable partitions.**
3. This Section is provided for the co-ordination information for the Contractor.

1.2. Related Work Specified Elsewhere

- | | |
|------------------------------------|----------------------|
| 1. Rough Carpentry | Section 061000 |
| 2. Joint Protection | Section 079000 |
| 3. Hardware to Openings | Section 087000 |
| 4. Glazing to Openings | Section 088000 |
| 5. Interior Finishes System | Section 090500 |
| 6. Non-loadbearing Studs and Board | Section 092000 |
| 7. Painting & Coating | Section 099000 |
| 8. Installation of Building Signs | Section 101400 |
| 9. Window Films (N.I.C.) | Section 125250 |
| 10. Electrical Systems | Electrical Documents |

1.3. Submittals

1. Submit as described in Division 1:
 1. Sources of all materials, including fasteners, proposed for use in the Work.
 2. Duplicate samples of all materials, fasteners, Products, and accessories proposed for the Work, including finishes.
2. Submit detailed shop drawings, showing all elements of the system, including fabrication and installation details, fastenings, accessories, types of material and finishes.
3. Product certificate certifying compliance with specified performance characteristics and criteria, and physical requirements.
4. Manufacturer's installation and assembly instructions.
5. Closeout Submittals
 1. Warranty documents as specified.
 2. Maintenance data.

1.4. Quality Assurance

1. Installation shall be by manufacturer's forces or certified trained personnel acceptable to the Consultant and the System manufacturer.
2. Supplier shall take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of the work to adjacent elements.

1.5. References and Compliance

1. ANSI/BIFMA

1. Solid wall units shall support a minimum load of 750-pounds per side in compliance with ANSI/BIFMAX5.6 – 1986.

2. ASTM: American Society for Testing and Materials

1. Units have a Class-A rating in accordance with ASTM E84-97a “Standard Method for Surface Characteristics of Building Materials”.
2. All system is in compliance with ASTM E 72 “Standard Test Methods of Conducting Strength Tests of Panels for Building Construction”.
3. Solid wall units are available with a 41 or 45 STC in accordance with ASTM E 90-90 “Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions”.

3. Life Safety

1. Provide laboratory certification confirming wall panel construction flame spread and smoke index of 10 or less, when tested in accordance with the provisions of ASTM Designation E-84-97a, (Standard Method of Test for Surface Burning Characteristics of Building Materials) except for methods of calculating flame spread rates. Provide Canadian equivalency for tests under the Ontario Building Code, and submit to Consultant and authority.

1.6. Delivery, Handling and Storage

1. Deliver prefabricated metal partition components in containers, cartons or crated to provide protection during transit and prior to installation in the Work.
2. The Trade Contractor performing the work of this Section shall inspect all rough-in of partitions, ceilings, and other pertinent elements of adjacent construction and shall promptly report to the Contractor and Consultant any deviation that may affect system performance.
3. Inspect partition components upon delivery for damage. Remove and replace damaged items as described so that system is without defect prior to installation.
4. Ensure onsite storage and protection is provided in accordance with Division 1 requirements.

1.7. Warranty

1. Contractor and Supplier performing work under this Section shall warrant the work of this Section in accordance with Division 1 requirements and GC12.3.1 and 12.3.4, but for three (3) years.
2. The manufacturer of the Product supplied under this Section shall further warrant the Product in accordance with its manufacturer’s standard warranty, in accordance with GC12.3.6.

1.8. Building Systems Requirements

1. The work described by this Section is a component of the Building Systems as defined in Division 1. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved.
 1. Barrier Free Path of Travel
 2. Interior Finishing Systems

2. PRODUCTS

2.1. Acceptable Manufacturers

1. Glazed Aluminium Framed, double glazed screens to locations indicated on the architectural drawings: Technion Altos, double glazed with solid core door pivot door or sliding doors as indicated, and fixed panels with 10 mm clear tempered glass.

2.2. Partition Components

1. All glass framing and glazed wall system components shall be constructed of extruded aluminium, powder coat paint, colour shall be as selected by Owner. Doors shall be glass, and to Owner acceptance. Supply system complete with all levellers along base of system, gaskets to complete perimeter. Fabricated and constructed to meet Owner's requirements. Provide all hardware complete except removable lock rim cylinders where doors are scheduled for locking.
2. Glass wall panels shall be factory glazed and shall be constructed with integral levelling ability. Butt joints will be sealed with clear silicone sealant and connectors shall be provided as required by authorities for all tempered glass butt jointed panels in the system. Where indicated on drawings, corners shall be factory extruded aluminium and powder-coated to match remainder of system.
3. Doors shall be provided completed with Altos system, both sides, colour to match overall system or equivalent or Owner's selection from available hardware range.
4. Glass Panels shall be to suit frame profile and patterning as per Openings Schedules. Glass shall be clear tempered.
5. Seals to adjacent construction shall be provided complete by the Demountable Partition Trade Contractor, to provide effective seal between system and adjacent portions of floors, walls, partitions, and ceilings. Seal shall be to Consultant satisfaction after review of trade submittal.

2.3. Hardware

1. All hardware associated with sliding doors within the demountable partitions shall be provided by the Owner's nominated trade performing the work of this Section, complete.
2. All sliding and swing doors within the Demountable Partition Systems shall be provided by this Contract, including prep and excepting only the final installation of the prepared doors. All hardware associated with sliding and swing doors within the demountable partitions shall be by Owner's nominated Demountable Partition Trade Contractor (N.I.C.).

2.4. Glass and Glazing

1. The glass and glazing for demountable walls / partitions where shown on drawings shall be furnished by this Section, including all dry glazing seals and mounting. All glazing shall be factory-installed to frames.
2. All glass shall comply with OBC requirements for full height glazed screens, and shall be tinted tempered minimum 10mm thickness and of further thickness as required for the application.

2.4. Acoustical Performance

1. The demountable system shall be complete with all seals to perimeter and to sliding door openings to ensure complete seal of system to adjacent construction in the finished Work, excepting only required clearance at floor for door. Provide all gasket seals to suit the installation.

3. EXECUTION

3.1. Installation

1. Partition shall be installed without permanent fastenings over finished flooring to provide for complete flexibility of future changes without having to patch floor material.
2. Damage during supply or during or after installation until handover of the completed Work to the Owner shall be rectified as directed by Consultant, at no further cost to Contract. Where damage is not accepted by the Consultant, replace the defective portion of the system.
3. Ensure system support is by concealed means and methods and secured to supporting elements of other construction such that the demountable system transfers all forces to the Building Structural System. Do not rely upon non-loadbearing elements to support the systems. Provide all necessary support by co-ordination with other trades, in non-combustible materials.
4. Install system level, straight and true, and to meet tolerances for this contract as identified in Division 1.
5. Adjust operation of system.

3.2. Clean up and Protection

1. Clean and protect installation until handover of the Work to the Owner. Provide temporary tape, caution tape, or other method of obvious identification so that partition is not damaged by lifts or other operations. Store in the open position and retain such that workforce cannot operate the system except for demonstration to Consultant and Owner.
2. Prior to handover all surfaces shall be professionally cleaned, all stickers and similar removed and all adhesives from same thoroughly removed such that no residue remains. Owner shall back-charge where residues or stickers remain.

3.3. Window Films and Treatments (N.I.C.)

1. Window films and treatments shall be provided by Owner's forces, after installation of the partition system.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|--|--------------------------|
| 1. Rough Carpentry | Section 061000 |
| 2. Architectural Woodwork | Section 064000 |
| 3. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 4. Interior Finishes | Division 09 |
| 5. Specialty Wall Finishes | See Floor Finishes Plans |
| 6. Owner Supplied Equipment | Division 11 |
| 7. Electrical Devices | Electrical Documents |

1.3. Abbreviations

1. For the purposes of this Contract 'CG' denotes Corner Guards.
2. For the purposes of this Contract 'WG' denotes Wall Guards.

1.4. Submittals

1. Submit shop drawings in accordance with Division 1 requirements; and:
2. Samples of colour choices for wall guards from standard colour ranges for Owner's selection.

1.5. Reference Standards and Codes

1. Provide laboratory certification confirming construction flame spread of 150 or less, and smoke index of 10 or less, when tested in accordance with the provisions of ASTM Designation E-84-97a, (Standard Method of Test for Surface Burning Characteristics of Building Materials) except for methods of calculating flame spread rates. Provide Canadian equivalency for tests under the Ontario Building Code, and submit to Consultant and authority.

1.6. Indoor Air Quality Requirements

1. Confirm to Division 1 requirements for VOC content.

1.7. Warranty

1. Warrant in accordance with Division 1 requirements.

1.8. Building Systems Requirements

1. The work of this Section is a component of the Interior Finishes Building Systems. Provide the work so that the performance requirements of this system are achieved.

2. PRODUCTS

2.1. Corner Guards

1. Stainless steel to ASTM A167 and ASTM A269, Type 302 or 304, brushed finish standard, of sufficient thickness for intended application. Fabricate stainless steel 3.5" (89mm) by 3.5" (89mm) 'L' shaped corner guards, minimum 2mm (16 gauge) thickness stainless steel, with adhesive and exposed stainless steel fasteners, minimum 48" (1,200mm) high and higher where specifically indicated. Round all cut corner edges of units.
2. Location and number of corner guards shall be four (4), to locations as selected by Consultant.

3. EXECUTION

- 3.1. Verify ALL conditions are ready to receive work. Proceeding with installation applies acceptance of all conditions. Provide blocking and ensure continuous framed support to all corner guards.
- 3.2. Install corner guards (CG) to number and locations identified on the Architectural Floor Finishes Plans. Install to suit substrates, using both adhesive tape and mechanical fastening.
- 3.3. Clean and protect installation until handover of the Work to the Owner.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.

1.2. Related Requirements

- | | |
|--|------------------------------|
| 1. Rough Carpentry | Section 061000 |
| 2. Architectural Woodwork | Section 064000 |
| 3. Installation of Building Signs | Section 101400 |
| 4. Electrical and Mechanical Connections | Divisions 20 to 30 inclusive |

1.3. Co-ordination

1. Co-ordinate with the Owner for scheduling of Owner supplied equipment.
2. Review Owner's Supply Schedule and provide review and acceptance. Request cuts and shop drawings from Owner in a timely fashion, so that all service requirements can be provided prior to delivery of items. Owner will make reasonable effort to ensure deliveries at appropriate dates in conjunction with the Schedule.
3. Include delivery of Owner's Equipment on Construction Schedules and co-ordinate the Work to facilitate such supply and installations of same with all trade contractors forming part of the installation work for the item of equipment.

1.4. Basic Executions Requirements

1. Bring to Owner's attention any damage to supplied items that may affect Product warranty provisions, at time of receipt of Product by Contractor.

1.5. Warranties

1. In accordance with Division 1 requirements, warrant installation work.

1.6. Maintenance Manuals and Materials

1. Collect all hard copies of maintenance instructions delivered with supplied items, for inclusion in the Maintenance Manual. Where hard copies are not included, solicit electronic copies on behalf of the Owner.

1.7. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:
 1. Structural System, for blocking support of wall-mounted equipment
 2. Interior Finish System, for finishes and all components exposed in the finished Work
 3. Barrier-Free Path of Travel System, for mounting heights, and clearances
 4. Egress and Existing System, where installed within such routes.

2. PRODUCTS

2.1. Schedule of Equipment Supplied by Owner

1. The Owner shall supply for installation by the Contractor, including but not limited to:
 1. Interior Signage Supplied Cash Allowance, as set out in 101400.
 2. Wall-mounted Flat Screen Monitors, including their support brackets, allow for 2 (two), to locations indicated on Equipment Floor Plans.
 3. As set out in Equipment and Accessories Floor Plans and Schedules.

2.2. For each item, take delivery of items at edge of delivery truck, handle and transport to place of installation, all in accordance with the definition of "install" in Division 1. Protect and store items in accordance with Division 1 requirements until installation.

3. EXECUTION

- 3.1. This Contractor shall obtain information for Owner-supplied products from Owner's suppliers in due time to co-ordinate any rough-in requirements. Confirm height, location, and size of units with authorities having jurisdiction and the Owner. Do not rely upon drawings for final location of units.
- 3.2. Install owner-supplied products to locations, directed by Owner using further materials and methods necessary for suspension and securement at no additional cost to Owner.
- 3.3. Install all products listed in this Section to satisfaction of the Owner. Provide all connection work for equipment involving mechanical or electrical systems.
- 3.4. Ensure work over equipment locations is complete, and no further access is required.
- 3.5. Ensure floors are sealed and finished a minimum 24 hours prior to delivery and installation.
- 3.6. Cooperate with Owner's forces for installation of furnishings immediately following completion of areas for turn over to the Owner's use and enjoyment.
- 3.7. Cooperate with Owner's forces for installation of equipment control wiring, datacom equipment, security equipment, and communications and security lines and devices immediately following completion of areas for turn over to the Owner's use and enjoyment.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division One, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. The work of this Section is for supply and installation of the window shade unit product only (including adjustment and final commissioning of units). All co-ordination work, rough-in work, and construction adjacent the finished units described in this Section is included in the Work.

1.2. Related Requirements

- | | |
|--|----------------|
| 1. Selective Demolition | Section 024119 |
| 2. Rough Carpentry | Section 061000 |
| 3. Interior Finishing System | Section 090500 |
| 4. Non-Loadbearing Studs and Boardwork | Section 092000 |
| 5. Acoustical Ceiling Tile Systems | Section 095100 |
| 6. Painting and Coating | Section 099000 |

1.3. Quality Assurance

1. Installer qualifications: forces in the direct employ or under the control of the system manufacturer, skilled, trained and experienced in work of similar scope and complexity of work specified herein, with minimum 2 (two) years experience for the work superintendent.

1.4. Submittals

1. Submit in accordance with Division 1 requirements:
 1. Detailed shop drawings showing configurations, materials, finishes, methods of operation, joint locations and method of joining, anchorage details, fastening, and connections.
 2. A complete Schedule of window shades indicating dimensions of all units.
 3. Submit duplicate samples of all fabrics, and unit finishes.
 4. Submit test results showing conformance of fabric with OBC requirements for flame spread and smoke development characteristics for commercial and institutional use.

1.5. Warranty

1. Warrant in accordance with Division 1 and GC12.3.1 and 12.3.4, and further:
 1. The Contractor and Supplier of roller shades shall warrant the work of this Section in accordance with GC12.3.1 and 12.3.4, but for three (3) years.
 2. The Supplier and manufacturer of the Products supplied to the Work as described by this Section shall further warranty all Product directly to the Owner in accordance with manufacturer's warranty, in accordance with GC12.3.6.

1.6. Maintenance Manuals and Materials

1. Provide operation and maintenance data in accordance with the requirements of Division 1. Include description of maintenance, repairs, and part list for replacements.

1.7. Indoor Air Quality Requirements

1. Requirements for VOC and other characteristics for Products and materials specified in this Section are additionally specified in Section 018080, Indoor Air Quality. Products must conform to these requirements.

1.8. Identification of Building Systems

1. The work described by this Section forms components in the following Building Systems as defined in Section 019010. Comply with requirements for the integration of the work described in this Section into its roles in the various systems. Provide the work so that the performance requirements of the overall system of which it forms part is achieved. Trade contractors shall not proceed in uncertainty regarding the role or requirement of the component in relation to the system. Obtain clarification from the Contractor and the Trade Contractor responsible for the system, as set out in Section 019010:
 1. Barrier-free path-of-travel system
 2. Fire and Smoke Control Systems
 3. Interior Finishes System

2. PRODUCTS

2.1. Roller Shades:

1. The system shall be a roller system utilizing a bi-directional, wrap-spring clutch. The system must be capable of smoothly raising and lowering the shade to any desired height, and maintaining that height with zero slippage. The system must be electrically operated where indicated on drawings, otherwise chain-operated.
2. The clutch and automatic operating assembly must be provided to never require any adjustment, either upon installation or afterwards. Clutch may be mounted in either end of the roller tube. The clutch shall be made of high-strength fibreglass reinforced polyester and high carbon steel.
3. Chain operating loops must be qualified No. 10 nickel-plated steel ball chain, with upper and lower stops and an average tensile strength of 45 pounds. Electrically operated shades must provide for full up, full down selections as well as raising and lowering capability to any height.
4. Universal mounting brackets must be capable of mounting inside, outside or to the ceiling, with the clutch on either the right or left end of the roller. All brackets shall be made of .060" plated steel.
5. The roller tube shall be sufficient diameter and wall thickness to prevent excessive deflection along its length, and shall have an adhesive strip applied for attaching the fabric. The fabric shall be attached to the tube with an adhesive strip. A minimum of one turn of fabric must be placed on the roller before the working section of fabric starts.
6. Shade Fabric
 1. Shade fabric shall hang flat, without buckling or distortion.
 2. Fabric edge, when trimmed shall hang straight without ravelling.
 4. Fabric shall pass "Small Scale Vertical Burn Test" in accordance w CAN/ULC-S109-M87.
 5. Provide a double-hemmed pocket at the bottom of the shade fabric c/w bottom bar.
 6. Meeting requirements of Ontario Building Code for Flame Spread rating and smoke development classification for the building use and construction.
 7. Inherently anti-static, flame retardant, fade and stain resistant, light filtering, providing 3% openness factors. Fabric weights to range between 6.00 oz/sq.yd. - 20.70 oz/sq.yd., containing fiberglass, PVC, polyester, acrylic, vinyl laminates, cotton, and vinyl coatings. Finish selected by architect from manufacturer's available contract colours.

7. Hembar: satin-coated steel, flat bars, single lengths for each shade panel. Insert in fabric pocket and sew both ends.
8. Standard of acceptance
 1. Sun Glow Window Covering Products of Canada Ltd., www.mysunglow.com, Telephone: 416-266-3501. Vision Modular Roller System with sunscreen Fabric CSR 103.3% Openness, colour "Grey-White". AAM12 C22 A31 clear anodized aluminium valence, aluminium bottom rail, clear stoppers and clips for chain mounting. Shades may be ceiling or wall mounted, as indicated.
9. Acceptable Alternatives
 1. Request for equivalent products is to be issued during the bidding phase.

3. EXECUTION

3.1. Preparations

1. Take onsite measurements after erection of work upon which the work of this Section depends. Inspect for levels and ensure allowances for window openings, ceiling and sill heights, and final thicknesses of other finish installations.
2. Do not install work described by this Section, except for rough-in, until immediately prior to occupancy and acceptance of the Work by the Owner. All window and sill work, all touch-ups and deficiencies in painting and finish work must be completed to the acceptance of the Consultant for all areas near the installation of blinds, drapery, and shades.

3.2. Fabrication and Installation

1. Refer to drawings for windows to receive roller shades.
2. Fabricate and install work of this Section square, plumb, and true, in required configurations and locations, securely anchored to supporting work.
3. Blackout systems shall meet the acceptance of the Owner. Revise, re-install, or replace at no cost to the Owner where blackout of the space or area is not achieved.
4. Incorporate shades into valences as indicated on drawings. Perform all preparatory work to accept the shade product as included in the Work.
5. Accept delivery of the units supplied and install the units to their final position. It includes for test operation of each unit and, if necessary make adjustments to ensure proper operation.

3.3. Inspection and Clean up

1. Clean and protect installation until handover of the Work to the Owner. Keep in the recessed position. This work is required by the Contract and is not included in the Cash Allowance amount. Pay all costs for cleaning and protection.
2. The only trade contractor or workman that shall operate blinds, drapery, or shades once installed and adjusted is the Window Covering Trade Contractor. No exceptions.
3. Replace all damaged units complete, howsoever damage is caused. Pay all costs for replacement.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated herein.
2. The Mechanical Trade Contractor (as Subcontractor to the Contractor) shall contract for all portions of the Work (the Mechanical Part of the Work) as follows:
 1. described by Divisions 20-25 inclusive (24 excepted) of the specifications, including work described that relies upon descriptions of materials, methods, or quality set out in other specification Divisions which are referenced therein,
 2. indicated on the mechanical drawings and schedules, and
 3. all related work and services as set out or referenced in Division 1 General Requirements, and the Conditions of the Contract, as they may affect the Mechanical Part of the Work.
3. The Mechanical Trade Contractor shall organize and accept bids for aspects of the Mechanical Part of the Work from Suppliers and Subcontractors as set out in these specifications, and shall be fully responsible for the Mechanical Part of the Work, including all such Subcontracts and Supply Contracts. Any variance from the assignment of responsibilities within the Mechanical Trade Contractor's chosen methods of subcontracting and/or organizing of the Mechanical Part of the Work shall not relieve the Mechanical Trade Contractor of any responsibility set out anywhere in the Contract Documents that is assigned to it. More particularly:
 1. Testing and Balancing work shall be by an accepted independent testing and balancing firm acceptable to the Owner, with demonstrated experience in working with municipal government projects. See list of qualified firms.
 2. All controls work to the HVAC systems shall be performed as part of this Contract, by Owner's nominated trade contractor, Jade Logic. Mechanical Trade Contractor shall solicit and accept bid from this firm and shall carry all costs for controls work by this firm in its pricing.
4. The work and services described by this Section and its further references are required by the Contract and shall govern all sections of Divisions 20, 21, 22, 23, and 25 (hereinafter "the Mechanical Divisions") as if repeated therein.
5. The Contractor and all Trade Contractors and all bidders shall carefully inspect all sections and divisions of the bid forms, the specification in its entirety, and the drawings, and any addenda to ensure that work described in this section and this division of the specification is understood together with all related items required by the Contract. Requirements for this inspection are set out in Division 1 as well as the General and Supplementary Conditions of the Contract.
6. The Contractor and all bidders in the contract bidding hierarchy shall solicit and determine the potential and intention for its Subcontractors and Suppliers to in turn provide bids to it for aspects of the Work, and shall provide a lead letter to them outlining the method and manner of the division of the Work as proposed, including requirements for the work schedule. All costs, organization and timing of the aspects of the Work required to achieve the contract schedule are included in the Contract Amount.
7. All bidding Trade Contractor Subcontractors and Suppliers shall review the bid forms well prior to bid closing, and shall provide lead letters to identify all proposed alternatives and any proposed variances from the division of the Work as proposed by the bidding General Contractor. Provide information to the bidding General Contractor to enable the bidding General Contractor to complete bid forms with all required bid information in a timely manner, including but not limited to:
 1. Stipulated Price

2. Alternative Prices
3. Separate Prices
4. Unit Prices
5. Itemized Prices
6. Bidder's Alternatives
7. Lists of Trade Contractors
8. Lists of Suppliers and Product Selection
9. Price Breakdowns
10. Provision of Cash Allowances, as follows:
 1. Cash Allowance for replacement of existing sanitary piping shall be carried by the general contracting bidder, **and not by the bidding mechanical trade**. See general bid forms and the Cash Allowance Section of Division 1.
8. Comply with the bidding provisions for bidding, inclusion of taxes, examination of existing conditions and reference documents and bidding procedures. This information is set out in Division 0 of the specifications.
9. Definitions and general contract procedures are described in the Articles, Definitions, General Conditions, Supplementary Conditions, Section 002000 Existing Conditions, and Division 1 of the specification.
10. Additional requirements may be specified on drawings or in specification sections. Comply with the most stringent requirements wherever stated or reasonably implied.
11. Organization of the Documents
 1. Nothing in the organization of the Tender and Contract Documents shall imply a division of the construction and related services that are required by the Contract into separate units of work or subcontracts unless specifically so stated. The Contractor shall perform the Work as one integral construction, and shall arrange for the division of the Work to best ensure its timely performance by qualified workmanship as set out in Division 1 of the Specification.
 2. The technical sections of this Division are artificially divided into sections for ready reference purposes only. The Consultant shall not act as an arbiter or establish the division of requirements of the Contract into units or Subcontracts of any kind unless such division is specifically so stated. Particular specification sections of this Division shall always be read within the context and requirements of the General Requirements of this Division, which shall always be read within the context and requirements of Division 1, and in turn within the general terms and conditions of the Contract.
 3. In general, and without limiting specific requirements stated elsewhere, the construction and related services described in this Division shall be understood within the context of specific Building Systems as defined and set out in Division 1. Responsibility for the achievement of contract requirements with respect to each Building System is the Contractor's, and are in turn further and additionally assigned by the Contractor to specific trade contractors as set out in the Documents.
 4. The Contractor, all bidders, and the trade contractors shall carefully review the requirements for Building Systems performance, construction, and related services as set out in the Contract, and shall include all costs to perform the Work to these requirements.
 5. Drawings for Building Systems are schematic diagrams only, and do not govern the amount of work, organization, design, Product, or material required to achieve conformance with Contract requirements.
12. Mention in the specification or notation or indication on Drawings of products, materials,

operations or methods means the Contract requires:

1. Supply of each item mentioned or indicated, to exceed specification provisions for quality, and subject to any particulars or qualifications noted;
 2. Installation according to conditions stated or inferable and as required to contribute to the Building Systems of which it forms part;
 3. Successful provision of performance requirements of the components and the Building Systems of which it forms part, for each operation or method prescribed or anticipated by the design; and
 4. The finished Work, with the furnishing of all necessary labour, equipment, and incidentals to achieve the above.
13. Where used, words "Section" and "Division" shall be deemed to mean the Contractor and the particular Trade Contractor or Subcontractor who shall provide the work of this Contract or such aspect of the work to make the Building System, finished work and site complete in all respects, and achieve system performance.
 14. "Supply" is defined in Section 016010, Basic Product Requirements.
 15. "Install" is defined in Section 017010, Basic Execution Requirements.
 16. "Provide" means to supply and install.
 17. Where used, wordings such as "as directed, permitted, permission, accepted, acceptance, report to", shall mean "by Consultant" in each case.

1.2. Existing Conditions

1. All bidders shall visit the place of the Work and examine in detail the existing conditions as set out in Section 002000, the documents in their entirety, and the place of the Work prior to submitting an offer for the Work or any of its aspects. No additional costs will be considered by the Owner for conditions and requirements that are reasonably inferable as necessary for the Work from such examination of the Place of the Work, existing building or existing Building Systems, including within accessible portions of existing ceiling spaces and service spaces.
2. Requirements for this inspection are set out in Division 1 as well as the General and Supplementary Conditions of the Contract.
3. No additional claims or costs will be accepted after tender and contract award because of claimed unfamiliarity with existing systems or conditions.
4. Existing Building Systems at the Place of the Work must be maintained until new systems or changes to systems are functional and accepted by the Owner in accordance with the Contract, unless written permission is given by the Owner for early decommissioning of such systems.

1.3. Abbreviations

1. Many words or expressions that are repeated frequently on the drawings or within the specifications are abbreviated to reduce the amount of wording that might obscure the detailing. To avoid misinterpretation, many of these abbreviations are listed, with their full meaning, in Section 011090 and elsewhere in the documents using legends and notes.
2. The Consultant's interpretation of the meaning or intent of an abbreviation shall be consistent with the intent of the Contract, but such finding shall be final. In all cases where meaning is not immediately clear, or is capable of varying interpretation, contact the Consultant for clarification before proceeding with the aspect of the Work affected.

1.4. Special Project Requirements

1. General requirements for accommodating the ongoing operation of the construction, for hoarding and security, for products likely to off-gas during and subsequent to their installation, and construction sequencing requirements are set out in the architectural drawing set, in the Owner's Operations, Safety, and Security Conditions, and in Section 011020 and elsewhere in Division 1 for Indoor Air Quality and building flushout. Trade Contractors shall adhere to these requirements in strict cooperation with the Contractor. Co-ordination of costs for these requirements shall be clearly set out by the Trade Contractor and Contractor in their agreement. No additional costs will be accepted by the Owner for the failure of the Contractor, a Trade Contractor Subcontractor, or Supplier to incorporate these contract requirements into its bidding or performance of its aspect of the Work.
2. Contractors are also hereby notified that all work must be performed so that Owner's subsequent maintenance is in accordance with the regulations of authorities regarding workplace safety and the use of ladders in the everyday maintenance of Building Systems. Mechanical elements requiring maintenance shall be placed accessibly, so that the Owner's ladders and work platforms can be used to safely perform regular maintenance requirements.
3. Trade Contractors are hereby notified that this Contract includes the performance of aspects of the Work within the occupied Owner's facilities and the new addition to facilitate the construction sequence. Cooperate fully with the Contractor for the organization and performance of such aspects of Work, including off-hours work, multiple mobilization and return of work areas for the Owner's daytime use, special provisions for temporary systems to ensure Owner's use of systems is not interrupted, and other measures all as reasonably required to minimize the Owner's inconvenience and disruption of existing operations.
4. The Work must be performed in accordance with requirements for behaviour, decorum, and workplace culture as set out in Division 1 and the Owner's Operations, Safety, and Security Conditions.

1.5. Schedule of Values, Allowances, Claims for Payment, Changes in the Work

1. All construction and related services within the Work has monetary value, which shall be itemized in the Contract Schedule of Values. No certification of value can be provided by the Consultant where an aspect of the Work is not performed. Trade Contractors shall co-operate with the Contractor in providing a full and complete breakdown of the Work in accordance with Section 012010, which shall govern as if repeated here.
2. Cash and Contingency Allowances are described in Section 012010 of the specification. Mechanical Trade Contractors shall review the Cash Allowances to ensure that the scope of such allowances are understood during the bidding period.
3. The intent of this specification is that all allowances shall be carried by the Contractor, not by individual Trade Contractors or Subcontractors. Contractor shall read entire specification prior to bidding and shall include in Stipulated Price Contract Sum, all allowances called for in this or any Section of Specifications or drawings. If allowances specified herein are repeated in other Sections, or if allowances are specified in other Sections but not listed in this Section, Subcontractors and Contractors are requested to inform Consultant immediately in order that action may be commenced to implement the express intent that all allowances be carried by the Contractor only.
4. Claims for payment shall be made in accordance with Section 012030. Trade Contractors shall provide all information necessary for the Contractor to fully account for all portions of claims for payment.
5. Requirements for the valuation of changes in the Work are set out in Section 012040. The mechanical trade contractor shall provide pricing for changes in accordance with the Mechanical Contractors Association of America (MCAA) Labor Estimating Manual, latest published version, at base rates without inclusion for inefficiencies or job conditions unless with

the consent of the Consultant, less 25%.

1.6. Project Meetings

1. Requirements for project meetings during the construction period are described in Section 013010 of the specification.
2. Trade Contractor participation and attendance at Pre-construction, Progress, Pre-Takeover, and Post-Construction Meetings is required. Trade Contractor representatives attending such meetings shall be the authorized representatives assigned responsibility for Building Systems and commissioning as set out in Sections 018010 and 019010.
3. The Contractor and Trade Subcontractors shall hold regular Interference and Co-ordination meetings to ensure the timely and proper co-ordination of the Work. The Contractor shall submit proceedings of such meetings to the Consultant within four business days of such meeting.
4. The Contractor, the Mechanical Trade Contractor, and his Trade Contractors shall schedule and hold a meeting with the Consultant during initial phases of project start-up to review and consider the means and methods proposed by the Contractor for installation of the systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and trade contractors who will perform the work.

1.7. Construction Schedules

1. The requirements for the scheduling of construction, and the requirements for submitted schedules relating to the timing of submissions, cash flow, and product delivery are described in Section 013020 of the specification.
2. No additional claims or costs will be accepted after tender and contract award because of claimed unfamiliarity with the Contractor's proposed schedule, including off-hours, holiday, and overtime work required to meet such schedule, by any Trade Contractor or Supplier.
3. All Trade Contractors shall solicit and obtain the Contractor's proposed schedule and organization of the Work prior to submitting a bid for the Work. Include all costs relating to such scheduling.
4. All Trade Contractors shall provide services required to review, prepare, and update the schedules required for submission to the Consultant as set out in Division 1.

1.8. Submittals

1. General requirements and procedures for preparation, inspection and certification, and provision of all submittals is described and referenced in Section 013030. All Trade Contractors and the Contractor shall adhere to the requirements set out in that Section, and elsewhere within the Contract Documents, in providing submittals and shop drawings that are required anywhere in the Contract Documents.
2. Review of Submittals and Shop Drawings by the Consultant and/or Owner is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that Consultant accepts detail design inherent in Submittals and Shop Drawings, responsibility for which shall remain with the Contractor and Trade Subcontractors and Suppliers as applicable, and such review shall not relieve the Contractor, trade Subcontractors, and Suppliers of responsibility for errors or omissions in the submittals and shop drawings or of responsibility for meeting all requirements of Contract Documents. The Contractor is responsible for dimensions of equipment to be confirmed and correlated at site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of work of all trades. Trade Subcontractors shall cooperate in such co-ordination and shall provide information accurately and completely in a timely manner to achieve Contract Requirements.

3. Provide for all work described by Divisions 20, 21, 22, and 23 the following submittals when requested for aspects of the Mechanical Part of the Work:
 1. Sleeving Drawings: to clearly and accurately determine the exact location, elevation and size of any and all formed holes, recesses and sleeving required to either existing conditions or new work. Provide a copy of accepted sleeving drawings to the reinforcement detailer well in advance of planned precast concrete fabrication, concrete pours and masonry construction. Design sleeves to allow for movement of element penetrated.
 2. Access Door Drawings: to clearly and accurately set out location, elevation and sizes of all access doors required to either existing conditions or new work. Provide a copy of the accepted access drawings to the appropriate installation trades well in advance of need.
 3. Interference Drawings: to clearly and accurately set out and interrelate the location, elevation and size of all crossings and relationships among existing conditions and all building services required in the work wherever such relationships may be problematic. Coordinate service location, routing and arrangement with existing conditions, work described by this Division, and work described elsewhere in the Documents. Provide copies of the drawings to the appropriate installation trades well in advance of need. Drawings shall also show inserts, special hangers and other features to indicate routing through concealed spaces, installation of coils, silencers and other such items in such confined areas.
 4. Detail Drawings: to clearly set out and interrelate all existing conditions and new work in shafts, mechanical equipment areas and rooms, service rooms and utility rooms. Base layouts on accepted Submittals and Shop Drawings and include, but do not necessarily limit to, details pertaining to access, clearances, tapings, sleeves, electrical connections, drains, service spaces and clearances for services and removals of components, and integral control drawings.
 5. Component diagrams: of each specific component of mechanical Building Systems operated by electrical or mechanical means. Indicate all wiring and operable mechanisms, both internal and external, for review and coordination of trades. Distribute to related Trade Contractors and obtain acceptance and certification of the diagrams by the Building System commissioning representatives to which they relate, as set out in Division 1.
 6. Composite Building System diagrams: of each specific mechanical Building System. Provide diagrams to reference and relate all component wiring and control mechanisms, and clearly establish control wiring and other control connections among the system components, both internal and external, for review and coordination of trades. Ensure that the diagrams clearly and separately demonstrate the methods of control that will achieve operation and performance of each and every sequence of control and each operating condition required of the system or to which the system shall be exposed in its service life. Ensure that all inputs and outputs to and from the Building System for existing elements and other systems are specifically shown and listed together with all requirements for such elements external to the system. Distribute the diagrams to related Trade Contractors and obtain acceptance and certification by Building System commissioning representatives to which they relate, as set out in Division 1.
4. Contractor's Material and Test Certificates: Prepare and submit such certificates for each Building System. Where certificates are prescribed by regulations, codes or standards ensure they conform to the requirements of those documents. Include a copy of each certificate in the Operation and Maintenance Manual. Certificates shall include, but are not limited to the following:
 1. Description of the system;
 2. Description of all tests conducted and results observed, including re-testing;
 3. Description of any corrective measures undertaken;

4. Description of materials used;
 5. List of witnesses for each test conducted;
 6. Date system left ready for service; and
 7. Signature of installing Trade Contractor and Building Systems Commissioning representative as set out in Division 1.
5. Submit in accordance with Division 1 requirements, and for each mechanical Building System, the following:
 1. a list of all products and materials complete with manufacturer and product numbers for Contractor's Material and Test Certificates;
 2. photographic documentation of new portion of system, and existing systems affected by the work described in this Section that will not be exposed in the finished Work;
 3. as-built and record drawings in accordance with Division 1 requirements;
 4. records of tests and certifications of the new portions of the system at rough-in and completion;
 5. record of acceptance of the system by authorities having jurisdiction;
 6. copies of all material and test certificates, system inspection reports, tests including failed tests, preliminary and final balancing reports, and certification of system to meet codes and regulations;
 7. copies of factory tests for all equipment;
 8. copies of all maintenance information and recommended spare parts lists for equipment; and
 9. manufacturer and product warranties, system warranties, in accordance with requirements of Division 1 for warranties.

1.9. Coordination

1. General requirements and procedures for co-ordination and layout of the Work, of its component parts, its relation to conditions and utilities whether existing or new, and whether provided under this Contract or by authority or utility, and for cutting and patching, is described and referenced in Section 013050. All Trade Contractors and the Contractor shall adhere to the requirements set out in that Section, and elsewhere within the Contract Documents, in co-ordinating the parts of the construction and services that are required anywhere in the Contract Documents, and in performing the work described therein.
2. Perform the total construction and related services so that requirements for cutting and alteration of existing elements and new construction are eliminated wherever possible. Where not possible, perform cutting and patching using trades fully qualified in the installation of the material being cut. Trade Contractors installing the item requiring to pass through do not perform the cutting and patching, although the cost of such cutting and patching shall be borne by that Trade Contractor.
3. The sequence of installation of Building Systems shall be planned by the Contractor and all Trade Contractors to facilitate the performance of the systems and the achievement of the design intent. The Contractor and all Trade Contractors shall take special care in the planning of the Contractor's sequences of installation that the inherent requirements of Building Systems dependent upon gravity, head pressure, or similar factors shall be installed early in the construction sequence to ensure that such performance is optimized.
4. The order of precedence of Building Systems for the purposes of co-ordinating the installation shall be as described in Section 019010, and generally as follows:
 1. Building Structural System takes precedence over,
 2. location of exposed devices and building elements in architectural elements such as ceilings, over
 3. location of systems in exposed architectural locations over,
 4. location of non-pressurised liquid systems functioning by gravity, over
 5. pressurised liquid systems requiring maintenance drainage, over
 6. pressurised air distribution systems, over

7. pressurised liquid and gas systems, over
 8. electrical distribution systems.
5. Mechanical Drawings do not show structural, architectural, and related details. Take information involving accurate measurement of building from building drawing notations, and also at building from existing conditions.
 6. Furnish "built in" items in ample time and give necessary information and assistance in connection with building in of same. Notify Trade Contractor concerned in writing of size and location of recesses, openings and chases at least 48 hours before walls are erected, floors poured and similar work.
 7. Where not sleeved, make holes through steel, concrete walls, floors and elements by hole drilling and concrete core drilling only. Verify location of structural reinforcing and concealed conduit and systems using appropriate methods such as x-ray, and obtain Consultant's acceptance before drilling. Under no circumstances core drill existing or new structural steel, pre-cast, pre- or post-tensioned concrete structure without written acceptance of the Consultant for each individual location. Obtain a professional engineer's review and acceptance at no cost to Owner upon request of Consultant.

1.10. Reference Standards and Codes

1. The relation of the Work to Reference Standards and Codes is described in the General Conditions and Supplementary Conditions of the Contract, in Section 014020, and elsewhere in the Contract Documents.
2. Conform to the contract requirements, regulations, and legislation of authorities having jurisdiction, as in force where the Work is located, meeting the more stringent requirement in each situation.
3. Apply for, obtain, and pay for all permits and inspections required by authorities having jurisdiction, including mechanical permits, with the exception of the municipal building permit only.
4. Furnish necessary certificates as evidence that work installed conforms with laws and regulations of authorities having jurisdiction. Work to meet such requirements is required by the Contract and included in the Contract Amount and Contract Time.
5. Conform to the recommendations of the organizations listed in Section 014020 for good practice. Use standards and codes referenced wherever in the Contract, in whole or in part, in their most recently revised or amended form, as specifically requested in the Specification and as applicable in normal industry practice:
 1. to the performance of the Work,
 2. to the interrelation of Products and their components,
 3. to the installation of such Products and execution of related services.
6. Equipment, materials, and workmanship provided under this Division shall conform to applicable standards and regulations of the following organizations:
 1. Ontario Building Code
 2. Ontario Fire Code
 3. CAN/CSA-B214 Installation Code for Hydronic Heating Systems
 4. CAN/CSA-B52 Mechanical Refrigeration Code
 5. CAN/CSA-B149.2 Propane Storage and Handling Code
 6. CAN/CSA-B149.1 Natural Gas and Propane Installation Code
 7. Canadian Heating, Ventilating and Air Conditioning Code
 8. N.F.P.A. Standards
 9. American Society of Heating, Refrigeration and Air Conditioning Engineers
 10. Ontario Gas Utilization Code.

11. Local Codes, Standards and Bylaws
 12. Ontario Ministry of Environment and Climate Change
 13. Technical Standards and Safety Authority (TSSA)
 14. Ministry of Health
 15. Boards, Services, Companies, and other Authorities having Jurisdiction
 16. Mechanical Contractors Association of America (MCAA)
7. Minor changes required by an authority having jurisdiction shall be carried out without change to the Contract Amount. Standards established by drawings and specifications shall not be reduced by applicable codes or regulations.
 8. File Contract Drawings with proper authorities and obtain their approval of installation and permits for same before proceeding with work. Prepare and submit necessary detailed shop drawings as required by Authorities.
 9. Pay all fees in connection with examination of drawings, permits, inspections and final certificate of approval by Authorities with jurisdiction over the Mechanical Part of the Work, excepting only the City of London Building Permit fee.

1.11. Quality Control

1. General requirements for quality control are described in Section 014050. Workmanship and method of installation shall conform to best standards and practice and be performed to acceptance. All work shall be performed by tradesmen skilled in the aspect of the work to be provided. Where required by local or other By Laws and Regulations or the Contract, tradesmen shall be licensed in their trade. Install all work and equipment to manufacturer's written directions for this specific contract.
 1. Trade workers shall have a Certificate of Qualification as Journeyman or Apprentice Registration for the Place of the Work or an Interprovincial Certificate.
 2. Ratio of journeyman to apprentice: not to exceed the defined ratio in the Apprenticeship Act of Ontario.
 3. Certificates and Registration must be provided to the Consultant on request.
 4. Maintain on-site an up-to-date record listing journeyman and apprentices working on site.
2. The Contractor, on request, will supply Trade Contractors with necessary levels and dimensions that are required to relate work described in this Division. Maintain all lines and levels so given.
3. Tolerances for the installation of the Work are defined and set out in Section 014050 as well as elsewhere in the Documents and as established by manufacturers and suppliers of Products. Conform to the most stringent requirements.
4. Temporary or trial usage of any device, machinery, apparatus, equipment, system, or materials shall not be construed as evidence of acceptance of same by either Consultant or Owner. No claim for damage shall be made for injury to or breaking of any part of such work that may be so used. The Contractor remains responsible for all elements of the construction until final acceptance of the Work in its entirety.
5. Provide testing of components and systems wherever required by the Consultant, by applicable law, code or regulation, by authorities having jurisdiction, and where stated in the Documents. This includes factory and off-site testing as well as at the Place of the Work.
6. Submit in accordance with general provisions all written record reports of all tests and of all certificates from independent agents certifying compliance and acceptance, including preliminary reports and reports involving failed tests.
7. Rough copies of test reports must be submitted by facsimile to the Consultant within 3 business days of date of test. Final issued copies of test reports must be submitted within 14 days of date of test. Work upon which the tested component or system depends, and work to cover such systems or components, proceeds at the Contractor's and applicable Trade Contractors sole risk

until review and acceptance of successful test certifications and reports by the Consultant.

1.12. Temporary Facilities

1. Temporary measures, required environments, and facilities for the performance of the Work are described in Sections 015010 and 015033. Conform to such requirements. The Contractor shall ensure such conformance and shall provide such measures and co-ordinate responsibility for such requirements among Contractor and Trade Contractors.
2. Each Trade Contractor is responsible to create suitable working environment for its workers and the products and materials being installed, and for protection of such products and materials prior and after installation until final acceptance of the Work, unless specific arrangements for such protection and environments have been made with the Contractor.
3. Temporary measures required by this Contract include provision of dust closures to open ends of all ductwork at all times during the course of the Work, except time of actual installation, and to all grilles and diffusers. Remove such protection only at system commissioning, and with the acceptance of the Owner. Ensure all such protection is removed prior to balancing of systems and inspect all ceiling spaces to ensure removal of such closures prior to handover of the Work.
4. Provide temporary office, workshop and tools and material storage space as necessary for the for the mechanical work and assume responsibility for any loss or damage thereto. Buildings erected for this purpose shall conform in appearance to those erected for similar purposes under other Divisions of Specification.
5. Provide scaffolding and shoring necessary for work of this and other Mechanical Divisions. Scaffolding and shoring shall be adequate to protect the workmen according to Provincial and Local Regulations.
6. Provide rigging and millwrighting, labour and equipment necessary for the work of this and other Mechanical Divisions. Employ only workmen well experienced and skilled in such trades for this portion of the work.
7. Provide hoisting machinery, operators, labour and materials necessary to lift and place equipment supplied under this and other Mechanical Divisions.
8. The permanent systems or any part thereof shall not be used during construction for construction purposes, unless so permitted by the Owner in writing.

1.13. Safety Requirements

1. General requirements for safety are described in the General Conditions and Supplementary Conditions of the Contract, and in Sections 015045 and 015046.
2. Specific requirements for safety and operations in relation to existing conditions and the Owner's operations and facility are described in Section 002000 and reference documentation.
3. Conform in all respects to the requirements for safety described in the Contract Documents, and applicable legislation and regulations referenced therein.
4. Provide on all corners and edges of equipment, ductwork piping, hangers and obstructions mounted less than 2 m above floor in mechanical or similar rooms, suitable pre-manufactured and purpose designed protective edge guards to protect persons from injury.

1.14. Environmental Protection

1. Measures and facilities for the protection of the environment during performance of the Work are described in Section 015060. Conform to such requirements. The Contractor shall ensure such conformance and shall provide such measures and co-ordinate responsibility for such requirements among Contractor and Trade Contractors.

1.15. Basic Product Requirements

1. Requirements for Products and supply of Products is described in Section 016010. Conform strictly to such requirements.
2. Alternatives & Substitutions
 1. Throughout Divisions 20, 21, 22, and 23, are lists of alternative manufacturers acceptable to the Consultant & Owner. These manufacturers have been deemed to have the ability to supply materials and product that meets the characteristics of the specified or described product or material item. Such products or materials may need to be customized or otherwise worked to achieve the characteristics required by the design and the Contract. The Contractor is cautioned that neither the Owner nor Consultant have made extensive investigation of the particular material or product characteristics of alternative manufacture to ensure that such products or materials meet the requirements of the Contract.
 2. Each Bidder may elect to use alternative products or materials from such lists, providing that the bidder investigate and determine any required changes or customization of the product or material necessary to ensure the performance of the Building Systems of which it forms part, its interrelationship with adjacent components, and achievement of the contract requirements.
 3. The Contractor and the Trade Contractor responsible for the Building System in which a product or material is to be installed shall ensure alternative products fit space allotted, provides all specified features, and gives performance specified. If an alternate product or material is proposed by the Contractor or Trade Contractor and does not fit space allotted nor is equivalent to the specified product in Consultant's opinion, regardless that the manufacturer has been nominated as an accepted alternative manufacturer, supply of the specified described product will be required without change in Contract Amount or Contract Time. Only manufacturers stated as specified or as acceptable alternative will be accepted for the bidding of the Contract. All other manufacturers shall be quoted as a Bidder's Alternative on the tender bid forms in accordance with provisions within the bid forms, accompanied by requested information and stating conditions and credit amount that may be applied to the Bid Price upon acceptance of the alternative by the Owner.
 4. If a product or material specified or described is unobtainable to meet Contract Time and Construction Schedule requirements, the use of a proposed substitute product or material shall be shown on the Bidder's Alternative section of the bid forms, together with an amount added or deducted from the Bid Price for its use. Extra monies will not be paid for substitutions after Contract has been awarded.
 5. If an item of a size or weight or capacity required by the Contract is unobtainable to meet Contract Time and Construction Schedule requirements, supply next larger size or capacity or heavier weight without additional cost to the Owner.

1.16. Basic Execution Requirements

1. The general requirements for execution of the Work are described in Section 017010.
2. Each Trade Contractor shall:
 1. Co-ordinate the execution and layout of his work and be responsible for any damage caused to other Trade Contractors or Owner by improper location or carrying out of same.
 2. Be responsible for prompt installation of work in advance of other portions of the Work upon which the Trade Contractor's work depends and to facilitate diligent and orderly progress of the Work.
 3. Protect all finished and unfinished work and existing conditions from potential damage by

performance of work described in this Division. Co-ordinate protection with Contractor.

4. Be responsible for condition of material and equipment supplied. Be responsible for protection and maintenance of work completed until termination and acceptance.
3. Mechanical Drawings are diagrams, and do not show the integrated construction required by the Contract. Take information involving accurate measurement of conditions from noted measurements on all Contract drawings, and at the Place of the Work, and verify all dimensions prior to performing work upon which such dimensions depend, wherever located. Make, without additional charge, any necessary changes or additions to runs of piping, conduits and ducts to accommodate existing conditions and the requirements of other parts of the Work. Route systems for best appearance, neat and straight in conformance with structural and architectural elements. Location of pipes, ducts, conduits and other equipment may be altered by the Consultant without extra charge provided change is made before installation and does not necessitate major additional material. Do not scale drawings.
4. As work progresses and before installing finish devices and elements of systems such as heating units, registers, diffusers, fixtures and other fittings and equipment that may interfere with interior treatment and use of building, obtain detailed instructions for exact location of such equipment and fitments. Ensure that installation of finish devices and equipment is performed upon completion and acceptance of surrounding finished elements.
5. Mechanical Drawings indicate general location and route of pipes, ducts and conduits that are to be installed. Where required work is not shown or only shown diagrammatically, install same to conserve headroom (minimum 7' 3" or 2200 mm clear) and interfere as little as possible with free use of space through which they pass. Conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical. Maintain minimum 24" (600mm) service space around serviceable units and as required for maintenance access and replacement of internal components.
6. Install piping and ductwork to clear structural members and any fireproofing or rated assemblies that are to be applied to such members. Locate mechanical work to permit installation of specified insulation. Do not remove or damage structural fireproofing or protections. Suspended elements or units of other construction shall not be obstructed from easy removal by interfering pipes, ducts, conduits or any other obstruction below the units.
7. Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels and dimensions to ensure proper and correct installation. Verify exterior municipal services.
8. Locate all mechanical and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.
9. In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose. Do not proceed in uncertainty.
10. Relocate equipment and/or material installed but not coordinated with work of other Sections as directed, without change in the Contract Amount or Time.
11. All components of equipment must be installed for easy service access. Consult with Consultant if intended design layout has to be modified to maintain service access shown on manufacturer's instructions or drawing details for component installation. As described elsewhere in this Section, co-ordination and planning of layouts, together with submittals and review of all conditions of the Work is a requirement of this Contract.
12. Securely plug or cap open ends of electrical raceways or equipment to prevent entry of dirt, dust, debris, water, snow or ice. Clean all equipment inside and outside before testing.

13. Equipment stored on site shall be protected from weather and kept dry and clean at all times. Take care to avoid corrosion of metal parts.
14. Protect work installed from damage. Secure all unfinished or loose work to prevent movement.

1.17. Cleaning and Construction Waste Management

1. Requirements for cleaning and the management of construction waste and recyclable materials during the progress of the Work and at the various stages of final completion of the Work are described in Section 017040 and 017042.
2. Without exception and in addition to any requirements of the Contractor, each Trade Contractor is responsible for cleaning the Place of the Work on a daily basis to ensure that all effects of its construction operations and execution of the aspect of the work for which the Trade Contractor is responsible achieve the orderliness and cleanliness of the Place of the Work required at the end of each working day. Each day, Trade Contractors shall remove from the Place of the Work surplus materials and debris resulting from the Trade's activities. Keep work areas clean and in a workmanlike manner at all times to acceptance of the Contractor, Consultant and Owner.
3. The Consultant may issue instructions to the Contractor to clean or manage waste and recyclables in accordance with Contract requirements whenever deemed necessary, including for special cleaning by outside cleaning forces at Trade Contractor expense.

1.18. Commissioning

1. Start-up, commissioning, and final commissioning are defined terms within this Contract, as described in Section 018010. No industry practice or common understanding shall detract from the definition of these terms as set out therein. The Contract requires that each Building System be overseen by a System Commissioner, who shall be an authorized representative of the trade contractor responsible for the system. The System Commissioner shall perform all functions as assigned in Division 01, working in cooperation with the Contractor's Commissioning Coordinator.
2. The Contractor and all Trade Contractors shall start up components, perform commissioning of systems, and perform final commissioning of systems as described in Section 018010 and elsewhere in the Contract Documents for particular systems, including all aspects of these operations. Where these operations are not performed to the satisfaction of the Consultant, by his sole criteria and judgment, perform or re-perform these requirements at no additional cost to the Owner as many times as instructed and as necessary to achieve the complete commissioning intent of each system and other systems upon which the system depends.
3. Commission HVAC equipment and systems through all cycles and seasons.
4. Instruct Owner's Building Operators in repair, maintenance and operation of the systems and associated equipment.
5. Arrange for on-site instruction by any product manufacturers where considered necessary by Consultant, or requested in the Contract Documents, at no additional cost to Owner.
6. Systems, equipment, and all major items of material shall be tested to the satisfaction of the Consultant, and as required to establish compliance with plans and specifications, and with the requirements for the Supply and Inspection Authorities.
7. Faulty and defective equipment shall be replaced with new materials.
8. Provide all work for equipment start-up, system start-up, commissioning, and final commissioning of Building Systems described in this Division, in accordance with requirements described in Division 1.
9. Arrange for additional on-site instruction by various manufacturers where considered

necessary by Consultant, at no additional cost to Owner.

1.19. Contract Closeout

1. Requirements and definitions for identification of defects and deficiencies, correction of same, Substantial Performance of the Work, and Completion of the Contract are described in Section 017070. The Contractor and all trade contractors shall conform to these requirements in all respects.
2. The Contractor, and more particularly the Trade Contractors performing work to Building Systems described by this Division, are cautioned that accomplishment of the Work involves both construction and related services. The related services have monetary value within the contract amount, and failure to perform related services in a timely manner to facilitate completion of the Work shall result in a finding of defective work by the Consultant, with related deduction of such monies from the Contract Amount.

1.20. Record Documents

1. The general requirements for photographic record of the installation of the Work, as-built drawings, and record drawings are described in Section 018040. Conform to these requirements.
2. Independently of the Contractor and the documents required by Section 018040, the Mechanical Trade Contractor shall obtain and pay for at least 2 (two) sets of blackline whiteprints upon which to clearly mark locations and installation of the systems as work progresses, changes and deviations from piping, ducts and equipment shown so that on completion Owner and Consultant will have records of exact location of these components. Earthloops shall be clearly marked on these drawings showing each loop number and its distance from a reference point on site. Locate exterior buried work by dimension from building including final top and invert elevations. Submit as-built drawings to the Contractor for inspection and acceptance prior to creating record drawings of the Building Systems, and prior to application for substantial performance.
3. The Contractor shall ensure that as-built information is accurately recorded and shall check same as the work progresses. As-Built drawings shall be reviewed with Consultant at each jobsite meeting.
4. Upon completion of Contract Work, prior to Substantial Performance inspection and after final review with Consultants, all Trade Contractors shall, in cooperation with the Contractor, neatly transfer recorded information and make final record submission to Consultant in the following form:
 1. One (1) set of clean, legible prints.
 2. In the form of electronic CAD drawings as set out in Section 018040.
5. Consultants shall review As-Built information provided by Contractor. Revise drawings to suit any comments until acceptable for submission to Owner.

1.21. Warranties

1. The Contractor and all Trade Contractors are specifically cautioned that all warranties relating to products and execution shall be in accordance with Section 017080. All warranties shall commence from the date of Substantial Performance of the Work, or the formal acceptance by the Consultant and Owner of the complete Building System of which a product or component forms part, regardless of the start-up date of such item, whichever is later.
2. The Contractor and all Trade contractors shall collect from their SubContractors and Suppliers all Guarantees/Warranties specified in the Contract Documents, in the form specified, and in addition all standard warranties offered by product manufacturer's whether specified or not. The Contractor and all Trade Contractors are specifically cautioned that the proper provision of warranties is required by the related services noted in Contract Close-out above.

3. The Contractor and each trade contractor assigned responsibility for a Building System shall provide a one year warranty to the Owner for the specific Building System, in accordance with the General Conditions of the Contract, as modified by the Supplementary Conditions.

1.22. Maintenance Manuals and Materials

1. The general requirements for the organization, formatting, and contents of Maintenance Manuals and the provision of maintenance materials is described in Section 018060. All Trade Contractors are responsible for collecting completing all submittals, shop drawings, instructions, data, operating instructions, trouble-shooting instructions, parts list, parts diagrams, evidence of all tests, maintenance manuals, valve tags and similar directories, balancing reports, and any other information requested in the Contract Documents, to assist the Contractor in assembling this information in neat manuals.
2. The Contractor shall be under no obligation to forward monies certified by the Consultant for the progress draw immediately prior to Substantial Completion, or for Substantial Completion, where a Trade Contractor is substantially deficient in the performance of duties related to warranties, manuals, and submittals.
3. Additional Requirements for the Mechanical Maintenance Manuals (see also Division 1)
 1. The manuals shall include complete operating instructions, installation, cleaning and lubricating procedures, preventative maintenance procedures etc., for each piece of equipment or system installed under the Mechanical Divisions. This information, instructions, and similar data, shall be prepared by the individual equipment manufacturer and as supplement by the manufacturer's designer if, and when, necessary.
 2. The manuals shall include a general arrangement of shop drawings, detailed drawings, applicable operating curves, etc. A complete parts list of assemblies and component parts for all equipment shall be provided, and shall include a recommended spare parts list, quantities, etc., showing the manufacturers name, catalogue number and closest supplier.
 3. All data supplied shall be pertinent to the specifics of the equipment installed and shall not be considered acceptable if the data is of a general nature.
 4. Within the period prior to acceptance of the Work, the Owner's personnel shall be instructed in the proper operation and maintenance of the systems and equipment installed. The instruction period shall be of sufficient duration to fully familiarize the operating personnel with the systems and equipment. The Owner's personnel shall be instructed in all aspects of the systems and equipment being accepted. The Contractor and Trade Contractors shall include all costs for such instruction to the satisfaction of the Owner, without limitation.

1.23. Contract Requirements for Building Systems

1. Definitions:
 1. *Control:* For clarity, the definition of control is referenced herein, as set out in Section 019010, Building Systems Requirements. In summary, control means a method by which a component of a Building System is instructed to perform the operations and functions to fulfil the requirements and intent of the Building System. All systems require control as an integral part of the Work and contract requirements. Controls shall have a similar meaning.

A Building Monitoring System (BMS) is only one aspect of the control requirements for Building Systems, and in the case of this contract there is no BMS system. Responsibility for all control requirements resides within particular Building Systems work, and not in any within any future BMS regardless of equipment or device capability. Provide all control instruction within the systems themselves at no cost to Owner and do not rely in any way upon potential or future or possible BMS installation or control as a reason that systems do not function to meet performance criteria for this Contract.
2. Provide all materials, products, work and services required to achieve the design intent and standards for detailed design, procedures, Products, systems, and execution of the Building

System as it can reasonably be inferred from the Contract Documents, including its proper and co-ordinated relation to other Systems, at no additional cost to the Owner.

3. Building Systems requirements are further described in Section 019010, together with assignment of responsibility for Building Systems to the Contractor and specific Trade Contractors. Trade Contractors performing work described in this Division shall perform all obligations for Building Systems as assigned. All Trade Contractors shall carefully inspect these requirements, and shall incorporate all such requirements into their work, price, and contractual obligations with the Contractor.
4. The Contractor and trade contractors are specifically cautioned that the contract requires detailed design, layout, and co-ordination services to ensure that the performance intent of the design prepared by the Consultant is achieved in the finished Work for each and all Building Systems. This requirement has monetary value as part of the Contract Amount. Failure to perform this requirement shall result in a reduction of the contract amount as found by the Consultant, regardless of the performance of other required aspects of the Contract.
5. The Contractor and each trade contractor assigned responsibility for a Building System shall provide a one year warranty to the Owner for the specific Building System, in accordance with the General Conditions of the Contract, as modified by the Supplementary Conditions.
6. Drawings for Building Systems are schematic diagrams only, and do not govern the amount of work, product, or material required to achieve conformance with Contract requirements.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with the requirements of Section 200500, Mechanical General Requirements, as if repeated herein.

1.2. Building System Requirements and Sequence of Operation

1. Provide all materials, products, work and services required to achieve the design intent and standards for detailed design, procedures, Products, systems, and execution of the Building System as it can reasonably be inferred from the Contract Documents, including its proper and co-ordinated relation to other Systems, at no additional cost to the Owner.
2. Comply with the requirements of Section 200500 and Section 019010, and requirements set out for particular Building Systems in the Specification.
3. The Contractor and all Trade Contractors are specifically cautioned that the Contract requires work and services to achieve the performance and intent of the Building Systems identified in Division 1 of the Specification, including but not limited to emergency egress systems, fire separation systems, barrier free access systems, and other systems that are created or altered by the finished Work.

1.3. Testing and Commissioning of Systems

1. Provide all materials, products, work and services required to balance, test, and adjust Building Systems to achieve specified performance, at no additional cost to the Owner.
2. Commissioning requirements are described in Section 200500 and Division 1 of this specification, as well as in particular sections for each Building System.

2. PRODUCTS AND EXECUTION

2.1. General Materials

1. Materials for this Contract shall be of high quality of their respective kinds and of uniform pattern throughout, in accordance with the requirements of Section 016010 and as further specified or noted for specific materials and products.
2. Install all materials and products to Consultants acceptance and requirements of Section 017010 and as further specified or noted for specific materials and products.
3. Install all materials and products parallel to building lines, whether exposed in the finished Work or not. Obtain clarification and acceptance of proposed routing of systems from Consultant. Do not proceed in uncertainty.

2.2. Excavation and Backfilling

1. Note applicable this Project.

2.3. Roof Penetrations, Flashings, Envelope Penetrations, and Penetrations of Wall, Floor, or Ceiling Assemblies, Penetrations of Members, Cutting and Patching

1. In general, the Trade Contractor responsible for the item penetrating the assembly shall supply the appropriate roof drain, stack, cone, sleeve, or flashing to a size to suit. The Contractor and the Trade Contractor shall co-ordinate the size and location of all such items, taking due regard for required clearances among the various elements and requirements for insulation surrounding the element and its connection to the Exterior Envelope System components. The

Roofing Trade Contractor shall install such items as an integral part of the roofing work. The Mechanical Trade Contractor shall engage and pay the Roofing Trade Contractor for building in, and for any cutting and patching of the roof to suit the electrical requirements. For wall and foundation penetrations of the Exterior Envelope System, the Mechanical Trade Contractor shall engage and pay the Contractor for the installation of the items unless other arrangements have been formally accepted during the bidding period.

3. Notwithstanding any payment arrangements, the Mechanical Trade Contractor shall not install components that are to be built in, or cut and patched, to the Environmental Separation System, to masonry, or to structural members including hollow core precast concrete. Such work must be performed by the Trade Contractor or Contractor responsible for the performance of the Envelope System, the mason, or the installer of the structural component, in each case.
4. Where drawings detail typical penetrations, supply the items in accordance with such details, as modified to suit particular penetration sizes and configurations.
5. The Mechanical Trade Contractor shall make contractual arrangements and pay for holing to deck, foundation walls, and other assemblies to allow the passage of his portion of the Work. Requirements for cutting and patching are further described in Division 1.
6. Where vents, stacks or other pipes or mechanical items pass through roof, supply Thaler insulated "Stack Jacks" spun aluminium flashings and telescopic cap, or equivalent by accepted manufacturer.

2.4. Vibration Isolation Requirements

1. Isolate all ductwork from fans or other items subject to vibration.

2.5. Painting and Identification Marking

1. All non-factory painting and applied finish coatings, whether site or shop applied, shall conform to the requirements described in Division 9 as if repeated herein, and additionally as described herein.
2. In general, all operating devices and equipment shall be supplied with factory-applied finish coatings as installed and warranted by the manufacturer. Choice of colour shall be by Consultant from standard offered ranges of colour from the manufacturer.
3. Supply all equipment and materials fabricated from iron or steel (except piping and ductwork materials) prime painted at factory before shipment. Minimum quality of primer, wherever installed, shall be as described in Division 9 for the specific material noted. If primer is damaged or the unit requires alteration for holing in shop or site, the Trade Contractor shall touch up with primers to match factory-priming and leave ready for painting. All auxiliary support steel described in Divisions 20 and elsewhere on Mechanical Specifications on Drawings, on on Drawings, shall be supplied by the Mechanical trade Contractor to the standards described in Division 5 for Miscellaneous Metal Fabrications, together with prime finishes identified therein.
4. Where not factory-finished by a manufacturer, all metal parts, miscellaneous metal items and work installed exterior to building must be degreased and prime painted unless G90 or Z275 galvanised. Wipe-coat galvanizing or standard duct galvanizing is not acceptable except where such item is scheduled in the Contract Documents to receive site finish priming and painting.
5. Finish painting of bare piping, ductwork, insulation and unfinished surfaces of equipment is described in Division 9 and as otherwise noted in these Divisions 20, 22, and 23. Where such items are noted for field finishes, leave all work in clean, paintable condition to the acceptance of the Painting Trade Contractor.

2.6. Valve Identification:

1. Identify location and system under valve control with a colour-coded thumbtack under valve on lay-in ceiling tile.
2. Label each balancing valve with a waterproof plastic tag, showing ID code, dial setting, flow, and date of balancing. Attach the tag securely with a tie-wrap or similar device capable of withstanding the temperatures that the valve will experience in operation.

2.7. Underground Tapes:

1. Reserved.

2.8. Pipe Painting and Identification

1. Exposed piping shall be painted in Owner's standard colours unless otherwise required by Code or Bylaw. Pipe painting shall be performed in accordance with the field painting requirements described in Division 9. Cooperate with Painting Trade Contractor to identify piping to ensure colour code is followed.
2. The Owner's schedule of colour coding for pipes shall be used as a standard throughout in accordance with identification of all piping on campus. The colour numbers have been taken from Federal Standard 595B. Conform additionally with CSA B53 – Identification of Piping Systems and ANSI/ASME A13.1 / 2007 - Scheme for the Identification of Piping Systems. The entire piping system is to be identified, including piping located in ceiling spaces, interstitial spaces, or within walls.
3. Piping in Other Areas - In areas other than Mechanical Rooms, etc., where piping is exposed to view in the finished work, such as exposed ceilings in Fire Apparatus Bay, piping shall be painted the same colour as the interior finishes, to the Consultant's satisfaction, performed by the painting trade contractor, except for colour code marking. The primary colour shall be applied in a band approximately 10" wide at each location where piping penetrates a wall, floor or ceiling, with the secondary colour band 2" wide in the middle of the wider band.
4. Pipe identification is required by the Owner as follows:
 1. at every point of entry or exit to a space, where the pipe penetrates a wall, floor, service column or enclosure;
 2. within 3 ft. (1 m) of and behind access doors;
 3. within 3 ft. (1 m) of pipe termination point;
 4. within 3 ft. (1 m) of branching off (or connecting to) a distribution header;
 5. at least every 25 ft. (8 m) along straight pipe lengths.
5. Pipe identification shall be visible from point of normal approach.
6. Pipe identification shall be applied to clean, dry surfaces only and installed according to manufacturer's instructions.
7. Identification markings and coding described in this Division shall be performed by the Trade Contractor responsible for the Building System to which such markings and coding apply. Install markings and coding after acceptance of finishes, to locations required by specification and to facilitate identification of systems in accordance with requirements of authorities having jurisdiction, including to concealed spaces. Timing of application for such markings shall be co-ordinated to suit progress of the Work.
8. In addition to the requirements for identification for piping that shall be provided, all grey water supply piping and other supply piping to domestic water fixtures that carries water within the building from cisterns, rain water leaders or other sources of non-potable water shall be clearly banded and marked with identification reading "non-potable water" at maximum 2 metre intervals, regardless of location and regardless of whether such piping is accessible in the finished work, to meet requirements of authorities.

9. Pipe label configuration is required by the Owner as follows:

1. Pipe identification shall consist of a label identifying the piping system contents, along with directional arrows indicating the flow direction.
2. Flow direction arrows shall be located at both ends of the pipe identification label.
3. Electrically traced piping shall have additional identification to show it is traced.
4. Nylon cable ties shall be used to secure pipe identification labels at both ends. Cable ties are in addition to the method of attachment provided by the pipe identification label itself.
5. Piping installed shall be identified using labels meeting requirements defined below.

10. Pipe label sizing is required by the Owner as follows:

1. Pipe identification and flow direction markers shall be appropriately sized to match the outer diameter of the finished pipe installation.
2. Label length and minimum text height shall be determined based on outside diameter of the finished pipe installation as follows:

| Outside Pipe Diameter | Minimum Length* of Label | Minimum Text Height |
|-----------------------|--------------------------|---------------------|
| 1/2" – 1-1/4" | 8" | 1/2" |
| 1-1/2" – 2" | 8" | 3/4" |
| 2-1/2" – 6" | 12" | 1-1/4" |

*Note: minimum length of label does not include flow direction arrows, which shall be additional

11. Pipe label materials:

1. semi-rigid plastic vinyl label printed with applicable abbreviation from Legend below;
2. label shall include text and flow direction arrows;
3. label and text colour as defined in Legend below;
4. chemical, UV light, and heat resistant, waterproof;
5. piping up to 6" OD: coil wrapped to snap around pipe and provide 360° visibility;
6. standard of acceptance shall be Brady: Snap-On and Strap-On, Seton: Snap-Around, SMS Smillie McAdams Summerlin: Coil Mark, Dura Label: Pipe Grabber Sleeves

12. Pipe Legend

| Label Abbreviation | System, Pipe Contents | Colour (Text – Background) |
|--------------------|--|----------------------------|
| NAT GAS | Natural Gas (all piping yellow) | Black – Yellow |
| PUMPED COND | Pumped Condensate | Black – Yellow |
| VENT | Vent (non-plumbing) | Black – Yellow |
| POT CW | Potable Cold Water | White - Green |
| POT HW | Potable Hot Water | White - Green |
| POT HWR | Potable Hot Water Recirculation | White – Green |
| TEMPERED | Potable Tempered Water – Safety Equip. | White – Green |
| SAN VENT | Sanitary Vent | White - Green |
| SAN | Sanitary Waste | White – Green |
| STEAM | Steam Condensate | White - Green |
| STORM | Storm Water Drain | White - Green |

13. Identification markings and codings shall be performed by the Trade Contractor responsible for the Building System to which such markings and coding apply. Install markings and coding after acceptance of finishes, to locations required by specification and to facilitate identification of systems in accordance with requirements of authorities having jurisdiction, including to concealed spaces. Timing of application for such markings shall be co-ordinated to suit progress of the Work.

2.9. Welding and Hot Work

1. Welding shall conform to the Welding Procedure Specifications (WPS) of CSA, and more particularly the W59/CSA W47.1 Standards and the AWS D1.1, AWS D1.3 and AWS D1.6 welding codes, all in their latest amended forms. Welders shall be licensed and certified in accordance with such standards and requirements of all authorities having jurisdiction for type of welding used, and such certification shall be valid at the Place of the Work. Either gas or electric welding may be used, as recommended by the manufacturer of the materials to be joined.
2. In every case of welding or hot work temporary protection and fire protection shall be designed and provided by the Trade Contractor performing the welding or hot work in accordance with Division 1 requirements and as necessary to eliminate the risk of fire hazard from such operations. Notwithstanding the responsibility for temporary protection that remains solely with the Contractor, every field welding operation required by the Work includes a written report assessment submitted by the Trade Contractor and Contractor that identifies the potential fire risks and potentially flammable or combustible materials at and adjacent to the proposed location of the work, or that may be affected by the welding or hot work. The assessment shall detail the methods by which the potential fire risks are to be eliminated. Operations shall be in accordance with the requirements of the reference information and existing conditions contained in the Contract General Conditions, Supplementary Conditions, and Existing Conditions documentation.
3. Every welding and hot work operation adjacent to existing services shall be reported to the Owner using a copy of the written report specified above, and to requirements of Safety Sections of Division 1, and the work shall include any requirements requested by the Owner for arrangement of the work.

2.10. Bases, Supports and Fasteners

1. All bases, supports, and fasteners shall conform to the requirements described in Division 1 as if repeated herein. This contract requires that all duct, pipe, and equipment support be to requirements of the Ontario Building Code and these specifications, but not to OBC Post-Disaster requirements.
2. In general the Trade Contractor installing a device, product, component, or material shall design and provide all fastenings, brackets, supports, bases, stands and platforms necessary for its installation to meet the requirements and performance noted in Division 1 and reference material, taking into account the characteristics of the component and the Building Systems of which it forms part, the recommendations of the component manufacturer for the specific installation location, and all existing conditions and conditions of service life.
3. This Contract requires the design and provision of all securement, anchorage and other fastenings necessary for the installation of the Work, using good practice and principles for such design identified in Division 1. Design of fastenings shall assume 50% failure of fasteners in each load transfer condition (compression, tension, and shear). By way of illustration, for a bracket with fastening plate subject to tension in top fasteners, compression in bottom fasteners, and shear transfer in all fasteners, such bracket must be fastened with a minimum of two top fasteners and two bottom fasteners each capable of fully accepting the imposed design load to allow for failure of one of the fasteners in each condition.
4. Curbs surrounding mechanical rooms, surrounding floor penetrations in mechanical rooms, and concrete housekeeping bases for major equipment in such rooms, are required as part of the Work.
5. All supports and fasteners shall be designed to minimize vibration transfer from operation of systems and anticipated conditions of service life.

6. Design and install supports so that system components can be adjusted after initial erection to achieve tolerances, be true in respect of alignment and grade, and allow controlled movement in accordance with Division 1 requirements for quality and to optimize the performance of the system in the conditions of anticipated service life. Provide such adjustments to optimize the installation immediately upon acceptance of tests during system rough-in.
7. Responsibility for the design and provision of supports and fasteners rests with the Trade Contractor installing the Building System that requires such support, until the forces imposed by the system components are correctly transferred to components of the building structural system at locations capable of accepting such transfer. The Building System Trade Contractor is responsible for evaluation of the structural Building System components and shall propose in writing the forces and locations of such proposed transfer, for acceptance by the Consultant.

In general, the structural Building System is composed of load-bearing concrete and masonry assemblies, structural steel, load-bearing studs and framing, and structural steel deck. Such components are identified on the structural drawings. The Trade Contractor may not transfer forces to structural steel roof deck, or elements not shown on structural drawings such as non-load-bearing masonry and framed partitions, suspended ceilings, and other similar items of the Work or existing conditions without the written acceptance of the Consultant, and only then for minor and "end of system" devices of the Building Systems with flexible connections, such as diffusers in ceiling systems.

8. Mount base mounted equipment on chamfered edge concrete housekeeping pads, minimum of 150 mm. (6") high and 150 mm (6") larger than equipment dimensions all around, and of further height as required to ensure that drain pan p-traps for all AHU's remain primed during operation.
 1. Each housekeeping pad (with muriatic acid solution) and rinse with clear water.
 2. Verify required acid-alkali balance is achieved and allow to dry.
 3. Paint concrete housekeeping pads with a water based epoxy; e.g. Glidden True Glaze Epoxy (WB), colour to match surrounding floor as closely as possible.
9. Do not use explosive or percussion type fastenings of any kind without prior acceptance in writing from the Consultant. Fasteners through floors and coatings must be sealed with neoprene gaskets and all brackets isolated from floors with neoprene gasket.

2.11. Hangers and Structural Framing Support

1. Hangers and structural framing supports are forms of support that are required by this Contract and shall be provided in accordance with the following particular requirements as well as the general requirements for supports and fasteners noted above. The Contract requires that each Building System Trade Contractor shall design and provide all systems of hangers to support unburied lengths of piping, ducts, control conduit, equipment, and any other components of the Building System for which the Trade Contractor is responsible. Obtain acceptance of methods of hanging and structural support to building before proceeding. Submit to the Consultant a proposed support method for all components of the Building System. Ensure that imposed design loads on the building structural system do not exceed maximum services loading shown in the Documents or as allowed by Consultant acceptance. Take special care to avoid introduction of undue reaction forces, sound transfer, movement and vibration into structure of building, to flanges of pumps and equipment, to expansion joints, to piping, and to other components of the Work or Building System.
2. Design and provide hangers and structural framing support to meet OBC requirements and this specification, so that insulation of system components can be effectively and most conveniently achieved by subsequent insulating operations.
3. Structural framing support shall be by Allstrut or Unistrut and shall incorporate all accessories required to accommodate hangers as specified herein. Size members, rod, and anchorage in strict accordance with manufacturer's design tables, to support anticipated loadings. Allow 20% further space and loading on supports for Owner's subsequent additional use.

4. Support unburied horizontal cast iron piping at each hub length and at maximum 5'-0" (1525mm) centres with Myatt #124 clevis hangers or equivalent by alternative manufacturer Grinnell. Where groups of fittings occur, not more than 2'-6" (760mm) shall be between hangers.
5. Support other horizontal piping with Myatt #124 clevis hangers or equivalent by alternative manufacturer Grinnell, with minimum of two supports to each direction of runs in excess of 1 metre, and as follows:
 1. Up to 32 mm size, 6'-0" (1830mm) maximum spacing
 2. 1.5" (38mm) size, 9'-0" (2700 mm) maximum spacing
 3. over 1.5" (38mm) to 3" (76mm) size, 10'-0" (3050mm) maximum spacing
 4. 3.5" (88mm) and larger size, 15'-0" (4570mm) maximum spacing
6. Support piping in accordance with more stringent requirements of Plumbing Code or other regulations where such regulations and codes are more stringent than this specification.
7. Provide oversized hangers for piping to permit insulation to pass through hangers.
8. Where hangers are grouped, locate spacing of support along its length by smallest size pipe.
9. Do not use trapeze type hangers unless specifically shown on drawings or specification. Where trapeze hangers are used, fit insulated piping with Myatt #251 or Grinnell #167 insulation shields taped to insulation.
10. Support through runs of vertical piping to adjacent building structure or support framing to adjacent building structure provided by this Trade Contractor in accordance with this Section, with Myatt #182 or Grinnell #261 riser clamps at each floor level of building structure or maximum of 10'-0" (3050mm) whichever is shorter. Secure vertical RWL, soil and vent risers at minimum 5'-0" (1525mm) intervals and to the acceptance of the Consultant. Secure small vertical piping with long ring stays.
11. On copper piping, provide separation material and effective barrier to ensure no contact between the copper and ferrous hangers, concrete or masonry, or other portions of the Work or existing conditions.
12. Support hangers with threaded mild steel hanger rods sized in accordance with hanger manufacturer's tables. Design and provide fastening to building structure by embedment of purpose-made male-female lag screw thread adaptors into wood construction, by Grinnell #281 or equal inserts into concrete, by beam clamps on to structural steel work, or by bolts or welding, all in accordance with support and fastener requirements described in this Section. Only where inserts are incorrectly cast-in may surface-fastened anchors be used.
13. Support piping on load-bearing walls with Myatt #157 offset wall hooks with toggle bolts or concrete anchors designed and sized to suit conditions. Fastening to load-bearing stud assemblies will only be permitted where fasteners impose loads directly to studs, and not to intervening wall surface components.
14. Where structural bearings do not exist in the structural Building System or existing conditions, this Trade Contractor shall provide miscellaneous steel angle or channel of sufficient size from other structural bearings to support hangers or equipment. Design and provide this support in accordance with Division 5 requirements for miscellaneous metals. The Contractor and Trade Contractor are cautioned that such miscellaneous metals are not shown on drawings of any kind, but are required by the Contract.
15. Wire, chain, strap or extension bar hangers are not acceptable under any circumstance.
16. Hangers shall be arranged so as to load structural steel in a concentric manner. Loads to be imparted on joists shall be imposed within 6" (150mm) of panel joints, to top chord of steel joists only.

17. Hang piping and other conduits for at least 2 (two) support points and a minimum of 10'-0" (3050mm) from isolated equipment or devices with Burgess Vibro Acoustics or equal "SH" isolators with steel spring having 1" (25mm) minimum static deflection and series connected elastomer element having static deflection of 1/4" (6mm) under load.

2.12. Sleeves, Firestopping, Smoke Seals, and Sealant Work

1. Where pipes or other system conduits of 3" (78mm) diameter and larger pass through concrete walls, provide metallic pipe sleeves of equivalent weight and material. Size sleeves on insulated piping or ducts to permit insulation to continue through sleeves, and in accordance with clearances for firestopping designs selected and provided by the Firestopping Trade Contractor.
2. Where conduit or ducts pass through concrete or frame construction above ground, provide 1.3mm thick galvanized steel sleeves. For copper pipe, provide equivalent copper pipe sleeves.
3. Sleeves on buried piping shall be 2" (50mm) larger all round than pipe and be filled with 2" (50mm) thick mineral wool insulation by Roxul or equivalent. The Trade Contractor installing the penetrating element shall caulk full perimeter of joints both interior and exterior with sealants to the requirements described in Division 7.
4. Firestopping and smoke seals are described in Division 7. All trade contractors shall co-ordinate and cooperate with the Contractor in the contractual division of the Work so that firestopping is provided by a single manufacturer's ULC-approved and local authorities accepted firestop systems to achieve the requirements of the fire separation systems identified in the Work.
5. No allowance shall be made for lack of sleeves or firestopping to constructed portions of systems, as a reason for not providing such sleeves and firestopping in new work.
6. As set out in Division 7, this Contract includes the provision of:
 1. New firestopping to penetrations of new system components to new fire separations.
 2. New firestopping to new penetrations of existing fire separations, in order to maintain integrity and continuity of such existing separations.
 3. The Contract requirement is to all fire separations, whether new or existing, identified in the Documents wherever such lack of firestopping can be reasonably identified by the trade contractor's inspection of the Place of the Work and the existing conditions. Such an inspection is deemed to have been performed by the act of the trade contractor's submission of a bid to the Contractor for provision of the building system, without qualification or caveat.
7. Sealant work is described in Division 7, and
 1. All trade contractors shall co-ordinate and cooperate with the Contractor in the contractual division of the Work so that sealant is provided by a single manufacturer's sealant to achieve the caulking and sealing requirements identified in the Documents, and to properly achieve sealing in existing conditions, regardless that sealant work shall be performed by each Trade Contractor for his portion of the Work (except to penetrations of exterior envelope, which shall be by the responsible Trade Contractor for the envelope).. This work includes, but is not limited to, sealing of all holes and openings for system components passing through floors and into shafts to a watertight condition. In firestopped conditions, sealing requirements may be accomplished by the firestopping work upon acceptance by the Consultant.

2.13. Access Doors

1. Each Trade Contractor responsible for a Building System described by these Divisions 20, 22, and 23 shall supply for all required locations, and in a timely manner, a 2.8 mm thick hinged metal access doors with frames suitable for the particular assemblies into which they shall be

installed, for all access points in the system. Access doors shall be installed by the Trade Contractor installing the assembly through which access is required.

2. Number and locations for access are not shown on drawings, and include but are not limited to locations in walls or ceilings to permit access to built in or inaccessible equipment, service points, controls, dampers, valves, cleanouts and components. Where lift out acoustic panel ceilings are used, access doors are not required but where requested by the Consultant panels shall be secured with accessible hold down clips and marked with Bildemup #6RH brass paper fasteners inserted through boards and bent over. Paint heads with red enamel before installation.
3. Access doors shall be equivalent to Stelpro Ltd. #722 flush type of size to suit ease of access for controls, valves, cleanouts, dampers or components serviced, minimum size 1'-4" x 1'-0" (400mm x 300mm) "Reach in", 1'-4" x 2'-0" (400mm x 600mm) "Crawl in", with prime coat finish, concealed hinges, screwdriver lock and plaster key. Access doors in finished masonry or drywall construction shall be #722 less plaster key. Access doors shall be #704 in drywall ceiling and #726E in plaster ceilings.
4. Access doors in fire rated ceiling assemblies, all fire rated walls, duct shafts or in corridor walls shall be UL, ULC or WHI listed 1 1/2 hour fire rated access doors equivalent to LeHage #L1010, Nailor Hart #0900 or Acudor #150B with screwdriver lock.
5. Acceptable Manufacturers:
 1. Smille, McAdams & Summerlin Ltd.
 2. Mifab (Modular Equipment Mfg. Inc.)
 3. Can Aqua Inc.
 4. Acudor Products Ltd.
 5. LeHage (Ancon Industries Ltd.)
 6. Nailor Hart Industries Inc.
6. Upon award of Contract, Trade Contractors and the Contractor shall co-operate to select a single manufacturer for access doors throughout the Work, for consistent appearance.
7. Access doors are to be provided (in ceilings or walls) adjacent to filter location and components of all mechanical equipment requiring service and maintenance.. Provide access doors in bottom of return duct at each heat pump for access to and cleaning coil.

2.14. Floor and Wall Plates

1. Provide one-piece nickel-plated flanges of stamped brass in finished areas at points where exposed uncovered pipe pass through walls, floor or ceilings. Secure plates at ceiling locations with integral brass set screw.
2. Split plates will not be accepted.

2.15. Wiring and Electrically Operated Equipment

1. Provide component control connections to all equipment scheduled on drawings or noted in specifications as "Owner-supplied", that forms a component of mechanical Building Systems. This includes all hard-wired equipment, process equipment, and includes adapting factory connections, providing necessary relay modules, and altering wiring to adapt Owner's equipment plugs and fittings to system needs. "Owner-supplied" means supplied by Owner to this Contract from a source outside this Contract. All equipment required in the Contract is by definition NOT Owner-supplied.
2. Approximate locations of electrical equipment, fixtures switches, outlets, and the like, are given on the drawings. Refer to the architectural drawings and room elevations for application. In

absence of definite detail exact location of outlets shall be determined on site as work progresses.

3. Confirm capacity, ratings and characteristics of equipment and items supplied by other Trade Contractors that are being incorporated into work of the Mechanical Trade Contractor. Resolve discrepancies before beginning power installations.
4. In general, all motor starters for equipment will be supplied by the Trade Contractor that supplies the equipment, for installation and connection by the Electrical Trade Contractor under the work described in Division 26.
5. Coordinate the exact location and verify characteristics of electrical provisions for the work described by Division 26 during the bidding period, and confirm upon Contract start.
6. The locations of starters, motors and associated equipment shall be coordinated with other Trade Contractors. Coordinate with the work of such Trade Contractors to ensure proper location of equipment. The exact locations of conduit terminations at electrically-powered units shall be determined from equipment manufacturers' shop drawings as approved by the Trade Contractor responsible for the system and accepted by the Consultant. Conduits must be installed to enter only in the locations designated by equipment manufacturers.
7. The right is reserved by the Owner and Consultant to alter the location of equipment and outlets a distance of up to 10'-0" (3050mm) without involving a change to the Contract amount, providing notice is given prior to installation.
8. The Electrical Trade Contractor provides power wiring and power connection to equipment where noted, regardless of supply by any Trade. The Electrical Trade Contractor provides all necessary wiring and connections that are "in line" in 120V and larger power wiring portions of the Electrical Distribution System, including wiring and installation of starters, interrupting thermostats, aquastats, speed controllers and time switches controlling equipment by interrupting the power feed to the equipment or device. Such devices and items are supplied by the Trade Contractor responsible for the Building System of which the item is a control or accessory component, and delivers the item to the Electrical Trade Contractor in a timely manner for incorporation into the Work and contract scheduling. Where systems and equipment have a power feed connection to a system control panel that incorporates line voltage power, and components of the system (including motors and equipment of whatever voltage) are then fed from that control panel, then the Trade Contractor responsible for that system shall provide the wiring and connection of such subsequent equipment and devices that are "down line" from the control panel unless it is explicitly noted otherwise on the drawings for each and every separate wiring requirement. The Trade Contractor, upon award of Contract, may elect to contract with the Electrical Trade Contractor for such work, but shall bid the work as set out herein.
9. The Electrical Trade Contractor shall wire and connect weatherproof unfused safety disconnect switches except as specifically noted above, fastened to exterior of roof mounted units, to acceptance. Electrical Trade Contractor shall supply such devices unless drawings and schedules for such units specifically note that such disconnects are factory-installed or manufacturer supplied. Where unit has been supplied without such protection, even though scheduled on drawings or noted in the specification, The Electrical Trade Contractor shall supply disconnects at the relevant Trade Contractor's cost and at no cost to the Owner.
10. All wiring for powering of components of a Building System must be in conduit or EMT using minimum #12 wiring and sized as required for deratings, with only the last 3 m of cabling being eligible for use of Bx cabling within ceiling areas with lay-in panel access. All components and wiring that is visible in the finished Work shall be in conduit. All work in service rooms and all work above drywall ceilings shall be in conduit.
11. In general, electric control connections and wiring necessary to provide control of components of a Building System, to ensure its complete and integrated function, and to ensure it fulfils each and every requirement of the system sequences of operation and the functions of the

component, shall be provided by the Trade Contractor responsible for such system, except as noted above for devices "in line" with Electrical Distribution System and devices that are explicitly scheduled for provision by the Electrical Trade Contractor or Building Monitoring System Trade Contractor.

12. All wiring for control of components of a Building System must be in conduit or EMT appropriately sized for deratings, using min. #18 wire for 24 volt control or less, and minimum #14 wire for 120V control. All wiring must be concealed except where explicitly accepted by notation on drawings or where located in service rooms. Use exposed conduit where wiring cannot be concealed in finished areas, after obtaining acceptance of Consultant in each case.
13. Electrically operated equipment shall be C.S.A. accepted and bear acceptance label. Special Inspection Label acceptable to provincial authority having jurisdiction will be accepted in lieu of C.S.A. acceptance.

2.16. Electric Pipe Tracing

1. Provide electric pipe tracing to all exterior and unheated locations of plumbing piping, prior to installation of pipe insulation, regardless of whether such tracing is shown on drawings. Only heat pipe tracing shown on electrical drawings shall be provided by the Electrical Trade Contractor. All other heat tracing required shall be provided by the Mechanical Trade Contractor.
2. Electric pipe tracing shall be Raychem 5XL-2-CR for freeze protection and HWT-Plus for temperature maintenance. All heat tracing cable shall be hard-wired, without exception.
3. All pipe tracings shall be 208V / 1 / 60 or 120V / 1 / 60 to suit Division 26 requirements.
4. Electric tracing shall be done with U.L. listed Raychem to pipes where required and as noted.
5. Each Trade Contractor shall provide splicing kit, thermostat, tee kit and end seals for cables as required to suit each installation.
6. Provide labels on completed covering at appropriate locations (to Consultant's acceptance) stating "Electric Traced".
7. This Trade Contractor shall arrange and pay for the provision of one 15A breaker in nearest 120V/208V or 120V/240V power panel breaker for each pipe tracing required by this specification and piping locations. Provide 2 #12 plus grounding in 5/8" (16mm) conduit from breaker to the pipe tracing cable c/w disconnect switch between power breaker and pipe tracing cable. Provide accessible junction box and all wiring and connections. All pipe tracing shall be hard-wired.

2.17. Motors, Starters and Controls, Variable Speed Drives

1. Reserved.

2.18. Pumps

1. Reserved.

2.19. Pipes and Fittings

1. Piping Tests
 1. In addition to tests required by local authorities, test new piping and drains in presence of Consultant as described in each Section of these Divisions 20, 22, and 23.
 2. Notify Consultant in writing at least 48 hours prior to start of tests. Failure to do so may require test to be redone.

2. General

1. Provide new pipe and fittings free from rust and scale of full weight, standard size and thickness, true and round with full cut threads where threaded connection methods are to be used. Cut pipes true with clean sharp pipe cutters. Ream and file ends of pipe and remove burrs from interior. Use reducing fittings instead of bushings wherever reductions in piping occur.
2. Install all piping to allow for expansion and contraction complete with swing joint as necessary.

3. Pipes and Fittings Materials and Products

1. Provide piping and fittings in accordance with Mechanical Specifications on Drawings.

4. Joints

1. Make all joints in piping to conform to Plumbing Code and to acceptance of Consultant and Plumbing Inspector.
2. Joints in buried pipe shall be of mechanical type as recommended by pipe manufacturer, ULI or ULC accepted and to local regulations.
3. Make joints in threaded pipe with lead free joint compound. Use of lampwick or hemp will not be permitted.

5. Expansion Provisions

1. The Contractor and Mechanical Trade Contractor shall inspect the documents, the existing conditions, and the reference documents, and shall identify all potential points of relative movement in the Building Structural System, ceiling, envelope and partition assemblies where installed piping of mechanical Building System crosses or penetrates these items, or is supported where live loads on the structure imposed by snow or occupancy may cause significant deflection of the supporting elements. The Contractor and Mechanical Trade Contractor shall ensure suitable provision in the piping installation for such movement. The Trade Contractor installing the piping shall install such expansion fittings and details within the piping to accommodate expected ranges of movement for the service conditions in which the system operates.
2. The Contractor and the Trade Contractor responsible for a system shall install piping with adequate provision for expansion and contraction of the system in reaction to changes in external temperatures or factors, or in reaction to internal fluctuations in temperature or other factors in the piping and system.
3. Additional measures required for isolation of equipment to ensure noise, movement, deflection, and vibration are not transmitted from equipment to the piping of the system are described in Sections for each system. In general, make provision for these factors and isolate all system elements that are subject to them using appropriate materials and methods acceptable to the Consultant.

2.20. Gauges and Valves

1. Gauges

1. Gauges shall generally be U.L.C. accepted pressure gauges, range 0 to 1050 kPa (0 150 psig) Metric or dual scale with at least 4 1/2" (114mm) dial face and complete with 6.4 brass petcock and snubber.
2. Gauges shall be sized in relation to design intent so that reading is generally in middle of gauge range.

3. Gauges for each mechanical Building System are specified in the section for such system, but the Mechanical Trade Contractor shall co-ordinate gauges among the systems so that one type and manufacturer is used throughout the Work unless a unique gauge is required for its application.
 4. Thermometers shall be Ashcroft or acceptable alternative. Alternatives are Taylor, Trerice and Winter's.
 5. Gauges shall be Ashcroft or acceptable alternative. Alternatives are Taylor, Trerice and Winter's.
2. Valves
 1. General
 1. Sufficient valves shall be installed within each system such as to provide the required flow control service and to allow isolation for inspection, maintenance and repair of each piece of equipment, fixture and each main and branch service loop. A union shall be installed within 500 mm of each threaded valve, unless the valve can be otherwise easily removed from the line.
 2. Each valve shall be installed such that it is easily accessible for operation, visual inspection and preventative maintenance. Valves shall be installed to isolate individual risers.
 3. Valves for each mechanical Building System may be additionally specified in the section for such system, but the Mechanical Trade Contractor shall co-ordinate valves among the systems so that one type and manufacturer is used throughout the Work unless a unique valve is required or specified for its application.
 4. Drawings and schematics do not show all valves required by the Contract. Provide all valves to suit drawings and schematics, and add valves where required or requested by the specification or reference standards. All such costs are including in the Contract Price and the Work.
 2. Acceptable Manufacturers –Valves to Fire Protection Systems
 1. Valves shall meet requirements of governing authorities and codes, shall be rated for 175 psi or better, and shall be as specified in this Section and further as specified in the Fire Protection, Sprinkler, and/or Standpipe specification section as applicable.
 3. Domestic Water Valves
 1. Up to NPS 2" inclusive: ball valves only, gate valves are not permitted. Substitute globe type valves for ball valves where throttling is required.
 2. Globe valves NPS 2 and under, soldered
 1. 850 kPa, to MSS SP-80, 300 CWP, bronze body, renewable composition PTFE disc, threaded over bonnet, lock shield handles as indicated. Standard of Acceptance is Kitz 10, Crane 1334/1320, Newman Hattersley 13 with NPT copper adaptors, Nibco S-235-Y
 3. Globe valves NPS 2 and under, threaded
 1. 1000 kPa, to MSS SP-80, Class 150, bronze body, renewable composition PTFE disc, union bonnet, lock shield handles as indicated. Standard of Acceptance is Kitz 09, Crane 7TF, Newman Hattersley 13, Nibco T-235-Y

4. Swing check valves NPS 2 and under, soldered
 1. 850 kPa, to MSS SP-80, bronze body, bronze swing disc, regrindable seat, screw-in cap, Standard of Acceptance is Kitz 23, Crane 1342, Newman Hattersley 47 with NPT copper adaptors, Nibco S-413
5. Swing check valves NPS 2 and under, threaded
 1. 850 kPa, to MSS SP-80, Class 125, bronze body, bronze swing disc, regrindable seat, screw-in cap. Standard of Acceptance is Kitz 22, Crane 37, Newman Hattersley 47, Nibco T-413
6. Ball valves up to NPS 2
 1. 1000 kPa, two piece bronze body and stainless steel ball and stem, PTFE seat rings, solder joint or NPT to copper adapters, full port. Standard of Acceptance is Kitz 69AMLL(soldered), Kitz 68AMLL (threaded), Crane 9212-SLL (soldered), Crane 9211-SLL (threaded), Nibco S-585-70-66LL (soldered), Nibco T-585-70-66LL (threaded)
3. Natural Gas Valves: Only valves with CGA certification embossed directly on valve body.
4. Steam and Condensate Valves (not Required this Contract)

2.21. Insulation

1. General Requirements for Insulation to Building Systems Described in Divisions 20, 22, or 23:
 1. Provide insulation of equipment, piping and ductwork as described or noted herein. Insulation is not shown on drawings. Insulation, jackets and adhesives shall be noncombustible, in compliance with Ontario Building Code; installed to manufacturer's standards, and to acceptance. Wheat pastes shall NOT be used. Products containing asbestos shall not be used. Make suitable accepted openings in insulation for inspection outlets and equipment nameplates.
 2. Materials shall be of best quality of their respective kinds and of uniform pattern throughout.
 3. All insulation products used shall be fully tested and accepted as fire retardant by Underwriters Laboratories of Canada Limited. Consultant may require submission of test data to composite insulation systems for fire hazard test rating.
 4. All insulating accessory materials shall be fire retardant. Adhesives shall be waterproof and incombustible flame resistant. Combustible wrappings or vapour barriers used in conjunction with thermal insulating materials shall be treated to reduce their combustibility. Flame spread classification of entire assembly shall not exceed 25 and smoke developed number shall not exceed 50. Submit report from an accepted testing laboratory confirming foregoing ratings.
 5. White plastic purpose-formed covering shall be applied to all exposed insulation in the finished Work unless prefinished insulation is specified.
 6. Where wire is specified to secure insulation, it shall be stainless steel wire, 1.3mm gauge, dead soft annealed type.
 7. Insulation shall be continuous throughout the Building System unless specifically noted otherwise, and shall be installed by a qualified insulating trade contractor with experience in the provision of similar work. Submit qualifications of the insulating trade contractor for

acceptance of the Consultant upon request.

8. Keep insulation materials dry and free of contaminants while in shipment and on site.
9. For insulation passing through floors, walls and similar barriers, co-ordinate size of sleeving with applicable trade Contractors to accommodate full thickness of insulation.
10. Insulation shall not be installed until piping and ductwork has been tested to Consultant's satisfaction. Repair to or replacement of insulation is required if installed prior to such testing acceptances being given.
11. This Contract requires insulation of the following Building Systems and components in accordance with the standards and prescriptive measures contained herein:
 1. All piping, fittings, headers, valves, flanges, and equipment and accessories to above-grade portions of storm, sanitary, water supply and hydronic transfer systems shall receive thermal insulation, complete, save only short runs of condensate piping to equipment mounted exterior to the building, gas piping, and portions of plumbing piping that function solely as venting.
 2. All interior portions of exhaust air ducts from backdraft dampers to louvres or outlets shall receive thermal insulation.
 3. Exterior of all ducts shall receive thermal insulation, except ducts for outdoor air intake ducts, which shall receive interior lined insulation.
 4. Gas piping shall receive insulation for a 2 metre length at all locations where it passes through the building envelope system.
 5. Transfer ducts need not be insulated with thermal insulation, but shall be completely lined with acoustic insulation to duct interior, shop installed.
 6. Initial 3 metres of supply and return ductwork from all fans, air handling units, packaged hvac units, furnace units and inline equipment likely to generate noise shall be interior-lined with acoustic insulation, shop installed.
 7. All return plenums shall receive acoustic insulation for first 3 metres of such ducts.
 8. All piping to exterior below grade locations shall be protected using rigid insulation placed above it where frost cover is deficient.
 9. All thermal insulation applied to exterior of pipes and ducts shall have an additional finish layer of cover, as set out in this specification.
12. Work that is inaccessible for application of insulation after installation shall be insulated and finished before being placed in position.
13. Acceptable Insulation Product and Material Manufacturer shall be Johns Manville top of line only.

Equivalent top of line Product and Material insulation from the following manufacturers are deemed acceptable alternatives:

1. Fiberglas
2. Knauf
3. Manson
4. Owens Corning

2. General Installation Requirements

1. Pipe and fittings shall be dry, free of dirt, scale, rust, oil and grease before insulation is applied. Rustproof ferrous materials where necessary as directed by Consultant using accepted materials and methods.
2. All insulation material and adhesives shall be installed in strict compliance with latest editions of manufacturer's recommendations and shall present neat workmanlike appearance upon completion.

3. Under no circumstances shall ambient temperature in space be less than 50 deg F during application of any insulation or finishing. Where higher temperature is required by manufacturer's recommendations, this higher temperature requirement shall be complied with.
 4. Work shall only be performed by tradesmen experienced in insulation work.
 5. Recover all interior insulation exposed to view with white PVC jacket.
 6. Work that will be inaccessible for application of insulation after installation shall be insulated and finished before being placed in position.
 7. Provide suitable accepted openings in insulation for inspection outlets, equipment nameplates and operating devices.
 8. Install all insulation in first class manner with smooth and even surfaces. Outline of round insulation shall be true circular and concentric shape. Outline of fitting insulation shall be shaped to blend with adjacent covering. Do not use scrap pieces of insulation where full-length section will fit.
 9. Joints in insulation shall be made by cementing pieces together and finishing so that there are no cracks or gaps.
 10. Take care that insulation over flexible connections in piping does not unduly increase lateral or longitudinal stiffness of connections.
 11. Sectional insulation furred into spaces or concealed in walls, hung ceilings and pipe spaces shall not have extra jacket. However, canvas covers supplied as standard on insulation used in such locations, shall remain with overlap pasted down.
 12. Keep insulation clear of instruments, controls, components, access doors and operating devices so that it will not hinder or interfere with removal, setting, reading of or access to same. Verify with Consultant as to whether such items are located properly before applying any insulation, otherwise be responsible for all retouching that may be required.
 13. Repair and reseal all breaks, cracks and perforations in vapour barriers. Seal all weld pin penetrations of vapour barrier with 4" x 4" (100 x 100mm) patch of aluminium foil tape.
 14. All insulation exposed to view in the finished Work shall be completed ready for painting as described in Division 9 by another Trade Contractor unless otherwise noted for finishes to be performed by the Insulating Trade Contractor.
 15. Insulation shall continue through sleeves and openings except at "Required Fire Separations" where sleeves and openings shall be "Fire Stopped". See 200500 - Sleeves. Insulation shall be butted tight to fire stopping and vapour sealed.
 16. Insulate all piping noted to be electrically traced. Install insulation after electric trace wiring is tested and accepted.
3. Pipe Insulation
1. For all unburied domestic cold water piping in the Work, including headers: 1" (25mm) thick heavy density glass fibre preformed pipe insulation with maximum of 0.033 conductivity at 10°C mean with factory applied vinyl foil kraft laminated glass fibre reinforced fire resistive vapour barrier jacket with not more than 1.15 perm rating (ASJ) with sealed lapped joints. Insulate heat pump condensate lines similarly.
 2. For all unburied domestic recirculation and hot water piping in the Work, including

headers: insulate with heavy density glass fibre preformed pipe insulation with maximum 0.043 conductivity at 93°C mean with factory applied fire resistive vapour barrier jacket of not more than 1.15 perm rating. Use 1" (25mm) thickness on piping up to 2" (50mm) size, and 1 1/2" (38mm) thickness on piping 2 1/2" (63mm) and above.

3. For all above-slab water and waste piping and trap below each Handicapped lavatory in the Work: insulate with 1/2" (13mm) Armaflex II or Acwil "Therma Cel" flexible foamed elastomeric insulation. Paint insulation with two coats of "White Finish".
 4. For all unburied Storm Sewage System rainwater leaders and storm drains both exposed and concealed in the Work: insulate with 1" (25mm) thick fibre-glass pipe covering with factory applied aluminium fire resistant vapour barrier and sealed lapped joints. Insulate underside of roof hoppers and roof drains.
 5. For all exterior exposed piping in the Work: weatherproof insulation with two coats of Flintkote #C 29 applied over 45# building paper copper wired on and sealed to acceptance. Install insulation after electric trace wiring is tested and accepted.
 6. For all pipe insulation in the mechanical rooms and areas apply smooth coat of insulating cement and recover with 6 oz (203.4 g/m²) canvas jacket neatly parted on with fireproof adhesive, then cover with PVC jacket.
 7. Pipe insulation shall be carried uninterrupted through pipe sleeves except where otherwise noted or required by Ontario Building Code or local authority. Where space will not permit application of sectional insulation on pipes in sleeves, pack sleeves with accepted fire-stop material.
 8. Carry insulation through hanger clevises and where noted. Use insulation protection saddles between clevis and insulation.
 9. Insulate water piping in cupboards and closets as for exposed piping.
 10. Hangers directly supporting cold water piping shall be insulated and vapour sealed as part of adjoining pipe.
 11. Buried cold water piping need not be insulated.
4. Insulation of Valves and Fittings
1. Insulation shall be continuous on piping systems. Insulate valves and joints to same thickness of insulation as specified for pipe. Seal vapour barriers to acceptance where pipes pass through sleeves after sleeves are packed.
 2. Do not insulate unions but terminate pipe insulation neatly with cement at each end of unions except on cold water piping where unions shall be insulated and marked for identification of union locations.
 3. Insulate valves and fittings with 1" (25mm) glass fibre blanket conforming to CGSB #51 BF11 compressed to same thickness as adjoining insulation and secured with jute twine. Over this apply smooth coat of insulating cement and recover with 4 oz. (135.6 g/m²) canvas. On cold water piping wrap blanket with foil faced friction tape overlapped to form vapour barrier before applying insulation cement. Seal all vapour barriers.
5. Insulation of Ducts
1. Seal duct insulation with mastic at all joints and pins. Tape all joints with accepted self-adhesive foil faced glass fibre reinforced 2" (50mm) wide vapour barrier tape. Where ducts are sound lined or fire proofed thermal insulation is not required but shall overlap liner at least 6" (150mm) except where noted.

2. Co operate with sheet metal installer to ensure correct installation of insulation plugs for pitot tube test openings in ductwork.
3. Duct insulation shall be carried uninterrupted through sleeves except where otherwise noted or required by Ontario Building Code or local authority. Where space will not permit application of sectional insulation on ducts in sleeves, pack sleeves with accepted fire stop material. Seal vapour barriers to acceptance where ducts pass through sleeves after sleeves are packed.
4. Where duct insulation is secured by wire, it shall not be drawn so tightly as to unduly compress insulation. Where Consultant finds insulation has been compressed too much under wire or twine or at corners, it shall be removed and reapplied.
5. Sagging of duct insulation is not acceptable. Remove and reapply.
6. Do not break continuity of insulation vapour barrier by hanger or rods. Remove hangers temporarily to facilitate installation of vapour barrier where required.
7. Provide cap strips to cover turned out legs of duct reinforcing & supporting members.
8. Seal duct insulation at all joints, pins and openings. Tape joints with accepted self adhesive foil faced 2" (50mm) wide vapour barrier tape.
9. Glass Fibre, Flexible Insulation: ASTM C553; flexible, non-combustible blanket, 'ksi' value: ASTM C518, 0.045 at 24°C, maximum service temperature 121°C, maximum moisture absorption 0.20 percent by volume, vapour barrier jacket kraft paper with glass fibre yarn and bonded to aluminized film, moisture vapour transmission ASTM E96 0.02 perm. Secure with pressure sensitive tape. Vapour barrier tape: kraft paper reinforced with glass fibre yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive. Outdoor vapour barrier mastic: vinyl emulsion type acrylic or mastic, compatible with insulation, black colour. Tie wire: annealed steel, 1.5 mm.
10. For all outdoor air supply and exhaust ducts (between unit and outside terminations) and for minimum 10'-0" (3050 mm) of exhaust air ducts as measured from exterior: interior insulate with 1" (25mm) thick, 72 kg/m³ density glass fibre rigid insulating board with foil vapour barrier, pinned on, with joints taped and sealed with noncombustible adhesive.
11. Internal insulation and lining to ducts is additionally described in Section 223000.
12. Glass Fibre, Rigid Insulation: ASTM C612 rigid, non-combustible blanket, 'ksi' value: ASTM C518, 0.036 at 24°C, maximum service temperature 121°C, maximum moisture absorption 0.20 percent by volume, density 48 kg/cu.m. Vapour barrier jacket: kraft paper with glass fibre yarn and bonded to aluminized film, moisture vapour transmission ASTM E96; 0.02 perm. Secure with pressure sensitive tape.
13. Duct Insulation Schedules

| Service | Type | Thickness |
|--|----------|-----------|
| Air supply rectangular | rigid | 25mm |
| Air supply round | flexible | 25mm |
| Exhaust 6' (2 m) from outside) rectangular | rigid | 75mm |
| Exhaust 6' (2 m) from outside) round | flexible | 75mm |
| Fresh air intake rectangular | rigid | 75mm |

| | | |
|---------------------|-------|-------|
| | | |
| Exhaust air plenums | rigid | 75mm |
| Ductwork outdoors | rigid | 75mm" |

6. Insulation of Access Doors in Ducts

1. Ensure that locations of access doors are confirmed and access doors installed wherever possible in the sequence of construction of the system, prior to beginning insulation installation.
2. Provide insulation to access doors to ensure operation of such doors. Where insulation is provided to components of systems where such doors are located, provide insulation to such access doors.
3. Insulate each duct access door to maintain insulation and vapour barrier rating when access door is closed.

2.22. System Component Identification

1. General Valve Identification and Manuals

1. All valves shall be identified as follows:
 1. To each valve, throughout the project shall be attached a brass tag, secured with a 3.5 mm thick brass ring and numbered to correspond with numbers, service description and location on chart.
 2. In each fan room or mechanical room, the mechanical contractor shall provide a glazed and framed valve chart permanently affixed in an accepted location; the chart shall have typed on it, the numbers of the valve tags in the particular fan room or mechanical room and the service description of each valve, including lines controlled. Mount 5'-0" (1500 mm) a.f.f to bottom of chart.
 3. In addition to the above, four (4) weeks prior to the completion date, or proposed takeover date of the project, the mechanical contractor shall provide to the Owner, four 215 x 280 mm loose leaf, three ring binders containing complete valve charts which shall list all of the valves in the building, including those in the fan or mechanical rooms. The charts shall list, types numbers corresponding to the valve tags, the service description of each valve and the location of the same. The charts shall be covered in heavy clear plastic.
 4. All of the above information must be available to the Owner's maintenance staff before takeover procedure can start.
2. Provide on each valve a 1" (25mm) diameter or larger brass tag with punched and embossed numbers. Valves immediately adjacent to plumbing fixtures or radiation need not be tagged. Each building system shall have a separate valve tag format and chart, clearly differentiated from tags for other systems. All valve charts shall be mounted in the same location for clarity of the differing identification systems.
3. Similarly glass frame each pressure vessel or H.W. tank certificate under glass and mount where directed in room where unit is located. Mount 5'-0" (1500mm) a.f.f. to bottom.
4. Provide and attach to each item of equipment (including electric motors), proper manufacturer's nameplate showing size, model number, serial number, and all information usually provided including voltage, cycle, phase and horsepower of motors and name and address of unit

manufacturer.

5. Ensure stamped, etched or engraved lettering on plates is legible. Nameplates shall not be painted over and where apparatus is insulated, provide adequate openings in insulation for viewing purposes.
6. Provide on each item of equipment, starters, timers and controls suitable nameplates, e.g. "Heat Pump #1, Second Floor Toilet Exhaust Fan Timer". Before nameplates are made, submit sample and list of names for acceptance. Make nameplates of 1.6 mm thick weather resistant rigid laminated plastic with engraved white letters on black background. Secure nameplates with drive screws. Make letters on starters, timers and small items at least 5mm high and at least 10mm high on larger units such as pumps, fans, boilers, A.C. & S.A. Units, H.P Units and condensers. Generally, unit nameplates shall conform to those noted in their Schedules. Where equipment and apparatus is insulated, the nameplate shall be mounted on the outside of the insulation. Original equipment nameplate data shall not be obscured and covered, but shall be left in a legible condition on each piece of equipment. The nameplate shall also give the design capacity of the equipment and the electrical characteristics.
7. Provide engraved black and white lamacoid plastic nameplates, 1" x 2 1/2" (25mm x 63mm) minimum at all duct mounted instruments, reset controls and panels so as to clearly indicate service of particular device. All manual switches unless they come with a standard nameplate shall be similarly labelled.
8. Provide for each concealed equipment requiring maintenance servicing, a stamped nameplate fixed to ceiling grid or ceiling access door indicating location of filters or similar to facilitate servicing. Obtain Consultant's acceptance of nameplate before installing.

2.23. Sequence of Operation and Building System Requirements

1. Complete controls for each Building System shall be provided by the Trade Contractor responsible for the Building System in order to achieve a complete and operating system. See Building System Requirements for co-ordination.
2. Under no circumstance shall a Building System or alteration to a Building System be provided in this Contract without the means to operate to achieve design intent and all sequences of operation which it must perform in expected service condition. All such work to achieve this performance, including components and installation, is required by this Contract.
3. All Trade Contractors and the Contractor are specifically cautioned that Building Systems must be provided with all controls, wiring, and components necessary for their operation, exclusive of any automated building energy monitoring or energy management control system. The function of such monitoring systems is to monitor and provide additional control that improves the energy performance of the Building System. Such systems do not replace the control of a Building System's components in relation to each other.

END OF SECTION

1. GENERAL

1.1. General Instructions

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated herein.
2. All electrical trade contractors and bidders shall inspect the complete architectural drawing package, as these documents provide items of work that pertain to all disciplines.
3. The Electrical Trade Contractor (as Subcontractor to the Contractor) shall contract for all portions of the Work (the Electrical Part of the Work) as follows:
 1. All Electrical Systems, including work that relies upon descriptions of materials, methods, or quality set out in other specification Divisions which are referenced therein;
 2. indicated on the Facility electrical drawings and schedules; and
 3. all related work and services as set out or referenced in Division 1 General Requirements, and the Conditions of the Contract, as they may affect the Electrical Part of the Work.
4. The Electrical Trade Contractor shall organize and accept bids for aspects of the Electrical Part of the Work from Suppliers and Subcontractors as set out in these specifications, and shall be fully responsible for the Electrical Part of the Work, including all such Subcontracts and Supply Contracts. Any variance from the assignment of responsibilities within the Electrical Trade Contractor's chosen methods of subcontracting and/or organizing of the Electrical Part of the Work shall not relieve the Electrical Trade Contractor of any responsibility set out anywhere in the Contract Documents that is assigned to it.
5. The work and services described by this Section and its further references are required by the Contract and shall govern all Electrical Work as if repeated therein.
6. The Contractor and all Trade Contractors and all bidders shall carefully inspect all sections and divisions of the bid forms, the specification in its entirety, and the drawings, and any addenda to ensure that work described in this section and the electrical specification is understood together with all related items required by the Contract. Requirements for this inspection are set out in Division 1 as well as the General and Supplementary Conditions of the Contract.
7. The Contractor and all bidders in the contract bidding hierarchy shall solicit and determine the potential and intention for its Subcontractors and Suppliers to in turn provide bids to it for aspects of the Work, and shall provide a lead letter to them outlining the method and manner of the division of the Work as proposed, including requirements for the work schedule. All costs, organization and timing of the aspects of the Work required to achieve the contract schedule are included in the Contract Amount.
8. All bidding Trade Contractor Subcontractors and Suppliers shall review the bid forms well prior to bid closing, and shall provide lead letters to identify all proposed alternatives and any proposed variances from the division of the Work as proposed by the bidding General Contractor. Provide information to the bidding General Contractor to enable the bidding General Contractor to complete all required bid forms with all required bid information in a timely manner, including but not limited to:
 1. Stipulated Price
 2. Alternative Prices
 3. Separate Prices
 4. Unit Prices
 5. Itemized Prices
 6. Bidder's Alternatives
 7. Lists of Trade Contractors
 8. Lists of Suppliers and Product Selection
 9. Price Breakdowns

9. Comply with the bidding provisions for bidding, inclusion of taxes, examination of existing conditions and reference documents and bidding procedures. This information is set out in Division 0 of the specifications.
10. Definitions and general contract procedures are described in the Articles, Definitions, General Conditions, Supplementary Conditions, Section 002000 Reference Documentation, and Division 1 of the specification.
11. Additional requirements may be specified on drawings or in specification sections. Comply with the most stringent requirements wherever stated or reasonably implied.
12. Organization of the Documents
 1. Nothing in the organization of the Bid and Contract Documents shall imply a division of the construction and related services that are required by the Contract into separate units of work or subcontracts unless specifically so stated. The Contractor shall perform the Work as one integral construction, and shall arrange for the division of the Work to best ensure its timely performance by qualified workmanship as set out in Division 1 of the Specification.
 2. The technical sections of this and others Divisions are artificially divided into sections for ready reference purposes only. The Consultant shall not act as an arbiter or establish the division of requirements of the Contract into units or Subcontracts of any kind unless specifically so stated. Particular specification sections of this or other Divisions shall always be read within the context and requirements of the General Work Requirements of this Division, which shall always be read within the context and requirements of Division 1, and in turn within the general terms and conditions of the Contract.
 3. In general, and without limiting specific requirements stated elsewhere, the construction and related services described in this Division shall be understood within the context of specific Building Systems as defined and set out in Division 1. Responsibility for the achievement of contract requirements with respect to each Building System is the Contractor's, and may in turn be required to be further and additionally assigned by the Contractor to a specific trade contractor as set out in the Documents.
 4. The Contractor, all bidders, and the trade contractors shall carefully review the requirements for Building Systems as set out in the Contract, and shall include all costs to perform the Work to these requirements.
 5. Drawings for Building Systems are schematic diagrams only, and do not govern the specific quantity of work, organization, design, Product, or material required to achieve conformance with Contract requirements.
13. Mention in the specification or notation or indication on Drawings of Products, materials, operations or methods means the Contract requires:
 1. Supply of each item mentioned or indicated, to exceed specification provisions for quality, and subject to any particulars or qualifications noted;
 2. Installation according to conditions stated or inferable and as required to contribute to the Building Systems of which it may form part;
 3. Successful provision of performance requirements of the components and the Building systems of which it may form part, for each operation or method prescribed or anticipated by the design and
 4. The finished Work, with the furnishing of all necessary labour, equipment, and incidentals to achieve the above.

14. Where used, words "Section" and "Division" shall be deemed to mean the Contractor and the particular Trade Contractor or Subcontractor who shall provide the work of this Contract or such aspect of the work to make the building system, finished work and site complete in all respects, and achieve system performance.
15. "Supply" is defined in Section 016010, Basic Product Requirements.
16. "Install" is defined in Section 017010, Basic Execution Requirements.
17. "Provide" means to supply and install.
18. "Exposed" means work normally visible, including work in equipment rooms and similar spaces
19. "finished area" means any area or part of an area which receives an in-situ finish or factory finish.
20. "governing authority" and/or "regulatory authority" and/or "Municipal authority" – means all government departments, agencies, standards, rules and regulations that apply to and govern the electrical work and to which the work must adhere
21. "O&M" – means Operating and Maintenance
22. Where used, wordings such as "as directed, permitted, permission, accepted, acceptance, report to", shall mean "by Consultant" in each case.

1.2. Existing Conditions

1. All bidders shall visit the place of the Work and examine in detail the existing conditions as set out in Section 002000 Reference Documentation, the documents in their entirety, and the place of the Work prior to submitting an offer for the Work or any of its aspects. No additional costs will be considered by the Owner for conditions and requirements that are reasonably inferable as necessary for the Work from such examination of the Place of the Work, existing site, or building systems, including within accessible portions of existing ceiling spaces and below existing slabs-on-grade.
2. Requirements for this inspection are set out in Division 1 as well as the General and Supplementary Conditions of the Contract.
3. No additional claims or costs will be accepted after bidding and contract award because of claimed unfamiliarity with existing conditions.
4. Existing building systems at the Place of the Work must be maintained until new systems or changes to systems are functional and accepted by the Owner in accordance with the Contract, unless written permission is given by the Owner for early decommissioning of such systems.

1.3. Abbreviations

1. Many words or expressions that are repeated frequently on the drawings or within the specifications are abbreviated to reduce the amount of wording that might obscure the detailing. To avoid misinterpretation, these abbreviations are listed, with their full meaning, in Section 011090 and elsewhere in the documents using legends and notes.
2. The Consultant's interpretation of the meaning or intent of an abbreviation shall be consistent with the intent of the Contract, but such finding shall be final. In all cases where meaning is not immediately clear, or is capable of varying interpretation, contact the Consultant for clarification before proceeding with the aspect of the Work affected.

1.4. Special Project Requirements

1. General requirements for accommodating the ongoing operation of the construction and systems, for hoarding and security, for products likely to off-gas during and subsequent to their installation, and construction sequencing requirements are set out in the architectural drawing set, and in Section 011020 and other sections of Division 1. Trade Contractors shall adhere to these requirements in strict cooperation with the Contractor. Co-ordination of costs for these requirements shall be clearly set out by the Trade Contractor and Contractor in their agreement. No additional costs will be accepted by the Owner for the failure of the Contractor, a Trade Contractor Subcontractor, or Supplier to incorporate these project requirements into its bidding or performance of its aspect of the Work.
2. Contractors are also hereby notified that all work must be in accordance with the regulations of authorities regarding workplace safety and the use of ladders in the everyday maintenance of building systems. All electrical elements requiring maintenance shall be placed accessibly, so that the Owner's ladders and work platforms can be used to safely perform regular maintenance requirements.
3. Trade Contractors are hereby notified that this Contract includes the performance of aspects of the Work within the occupied areas of the Building Landlord's facilities. Cooperate fully with the Contractor for the organization and performance of such aspects of Work, including off-hours work, multiple mobilizations and return of work areas for the Owner's, Building Landlord's or Landlord's Tenant's daytime use, special provisions for temporary systems to ensure use of systems is not interrupted, and other measures all as reasonably required to minimize inconvenience and disruption of existing operations.
4. The Work must be performed in accordance with requirements for behaviour, decorum, and workplace culture as set out in Division 01.

1.5. Schedule of Values, Allowances, Claims for Payment, Changes in the Work

1. All construction and related services within the Work has monetary value, which shall be itemized in the Contract Schedule of Values. No certification of value can be provided by the Consultant where an aspect of the Work is not performed. Trade Contractors shall co-operate with the Contractor in providing a full and complete breakdown of the Work in accordance with Section 012010, which shall govern as if repeated here.
2. Cash and Contingency Allowances are described in Section 012020 of the specification.
3. The intent of this specification is that all allowances shall be carried by the Contractor, not by individual Trade Contractors or Subcontractors. Contractor shall read entire specification prior to bidding and shall include in Stipulated Price Contract Sum, all allowances called for in this or any Section of Specifications or drawings. If allowances specified herein are repeated in other Sections, or if allowances are specified in other Sections but not listed in this Section, Subcontractors and Contractors are requested to inform Consultant immediately in order that action may be commenced to implement the express intent that all allowances be carried by the Contractor only.
4. Claims for payment shall be made in accordance with Section 012030. Trade Contractors shall provide all information necessary for the Contractor to fully account for all portions of claims for payment.
5. Requirements for the valuation of changes in the Work are set out in Section 012040. The Electrical trade contractor shall provide pricing for changes in accordance with the National Electrical Contractors Association (NECA) Manual of Labor Units, latest published version, at base rates without inclusion for inefficiencies or job conditions unless with the consent of the Consultant, less 25%.

1.6. Project Meetings

1. Requirements for project meetings during the construction period are described in Section 013010 of the specification.
2. Trade Contractor participation and attendance at Pre-construction, Progress, Pre-Takeover, and Post-Construction Meetings is required. Trade Contractor representatives attending such meetings shall be the authorized representatives assigned responsibility for building systems and commissioning as set out in Sections 018010 and 019010.
3. The Contractor and Trade Subcontractors shall hold regular Interference and Co-ordination meetings to ensure the timely and proper co-ordination of the Work. The Contractor shall submit proceedings of such meetings to the Consultant within four business days of such meeting.
4. The Electrical Trade Contractor shall schedule and organize during initial phases of project start-up a workshop session with the Consultant to review and consider the means and methods proposed by the Contractor for installation of the electrical systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and trade contractors who will perform the work.

1.7. Construction Schedule

1. The requirements for the scheduling of construction, and the requirements for submitted schedules relating to the timing of submissions, cash flow, and product delivery are described in Section 013020 of the specification.
2. No additional claims or costs will be accepted after bidding and contract award because of claimed unfamiliarity with the Contractor's proposed schedule, including off-hours, holiday, and overtime work required to meet such schedule, by any Trade Contractor or Supplier.
3. All Trade Contractors shall solicit and obtain the Contractor's proposed schedule and organization of the Work prior to submitting a bid for the Work. Include all costs relating to such scheduling.
4. All Trade Contractors shall provide services required to review, prepare, and update the schedules required for submission to the Consultant as set out in Division 1.

1.8. Submittals

1. General requirements and procedures for preparation, inspection and certification, and provision of all submittals is described and referenced in Section 013030. All Trade Contractors and the Contractor shall adhere to the requirements set out in that Section, and elsewhere within the Contract Documents, in providing submittals and shop drawings that are required anywhere in the Contract Documents.
2. Review of Submittals and Shop Drawings by the Consultant and/or Owner is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that Consultant accepts detail design inherent in Submittals and Shop Drawings, responsibility for which shall remain with the Contractor and Trade Subcontractors and Suppliers as applicable, and such review shall not relieve the Contractor, trade Subcontractors, and Suppliers of responsibility for errors or omissions in the submittals and shop drawings or of responsibility for meeting all requirements of Contract Documents. The Contractor is responsible for dimensions of equipment to be confirmed and correlated at site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co ordination of work of all trades. Trade Subcontractors shall cooperate in such co-ordination and shall provide information accurately and completely in a timely manner to achieve Contract Requirements.

3. Provide for all work described by the Electrical Documents inclusive the following submittals whenever requested by the Consultant, at trade contractor and Contractor expense:
 1. Sleeving Drawings:

To clearly and accurately determine the exact location, elevation and size of any and all formed holes, recesses and sleeving required to either existing conditions or new work. Provide a copy of accepted sleeving drawings to the reinforcement detailer well in advance of planned precast concrete fabrication, concrete pours and masonry construction. Design sleeves to allow for movement of element penetrated.
 2. Access Door Drawings:

To clearly and accurately set out location, elevation and sizes of all access doors required to either existing conditions or new work. Provide a copy of the accepted access drawings to the appropriate installation trades well in advance of need.
 3. Detail Drawings:

To clearly set out and interrelate all existing conditions and new work in shafts, pulling pits, equipment bases, anchors, floor and roof curbs, equipment areas and rooms, service rooms and utility rooms. Base layouts on accepted Submittals and Shop Drawings and include, but do not necessarily limit to, details pertaining to access, clearances, tappings, sleeves, electrical connections, service spaces and clearances for services and removals of components, and integral control drawings.
 4. Composite Building System diagrams:

Of each specific electrical building system. Provide diagrams to reference and relate all component wiring and control mechanisms, and clearly establish control wiring and other control connections among the system components, both internal and external, for review and coordination of trades. Ensure that the diagrams clearly and separately demonstrate the methods of control that will achieve operation and performance of each and every sequence of control and each operating condition required of the system or to which the system shall be exposed in its service life. Ensure that all inputs into the building system from existing elements and other systems are specifically shown and listed together with all requirements for such elements external to the system. Ensure that all outputs from the system to existing elements and other systems are specifically shown and listed together with all requirements for such outputs and the means to achieve them. Distribute the diagrams to related Trade Contractors and obtain acceptance and certification by Building System commissioning representatives to which they relate, as set out in Division 1.
 5. Co-operate with work of Mechanical Trade Contractor and provide data requested and as required in their preparation of interference drawings for the Mechanical Part of the Work.
4. Contractor's Material and Test Certificates: Prepare and submit certificates for each building system. Where certificates are prescribed by regulations, codes or standards ensure they conform to the requirements of those documents. Include a copy of each certificate in the Operation and Maintenance Manual. Certificates shall include, but are not limited to the following:
 1. Description of the system;
 2. Description of all tests conducted and results observed, including re-testing;
 3. Description of any corrective measures undertaken;
 4. Description of materials used;
 5. List of witnesses for each test conducted;
 6. Date system left ready for service; and
 7. Signature of installing Trade Contractor and Building Systems Commissioning representative as set out in Division 1.

5. Submit in accordance with Division 1, and for each electrical building system, the following:
 1. A list of all products and materials complete with manufacturer and product numbers for Contractor's Material and Test Certificates.
 2. Photographic documentation of new portion of system, and existing systems affected by the work described in this Section that will not be exposed in the finished Work.
 3. As-built and record drawings in accordance with Division 1 requirements.
 4. Records of tests and certifications of the system at rough-in and completion. This includes a test of the emergency lighting system, acceptable to authorities and the Consultant.
 5. Record of acceptance of the system by authorities having jurisdiction. This includes the Utility and the Electrical Safety Authority.
 6. Copies of all material and test certificates, system inspection reports, tests including failed tests, preliminary and final balancing reports, and certification of system to meet codes and regulations.
 7. Copies of factory tests for all equipment.
 8. Copies of all maintenance information and recommended spare parts lists for equipment.
 9. Manufacturer and product warranties, system warranties, in accordance with requirements of Division 1 for warranties.
6. Submit a list of proposed nameplates for acceptance before manufacturing.

1.9. Co-ordination

1. General requirements and procedures for co-ordination and layout of the Work, of its component parts, its relation to conditions and utilities whether existing or new, and whether provided under this Contract or by authority or utility, and for cutting and patching, is described and referenced in Section 013050. All Trade Contractors and the Contractor shall adhere to the requirements set out in that Section, and elsewhere within the Contract Documents, in co-ordinating the parts of the construction and services that are required anywhere in the Contract Documents, and in performing the work described therein.
2. Perform the total construction and related services so that requirements for cutting and alteration of existing elements and new construction are eliminated wherever possible. Where not possible, perform cutting and patching using trades fully qualified in the installation of the material being cut. Trade Contractors installing the item requiring to pass through do not perform the cutting and patching, although the cost of such cutting and patching shall be borne by that Trade Contractor.
3. The sequence of installation of building systems shall be planned by the Contractor and all Trade Contractors to facilitate the performance of the systems and the achievement of the design intent. The Contractor and all Trade Contractors shall take special care in the planning of the Contractor's sequences of installation that the inherent requirements of building systems dependent upon gravity, head pressure, or similar factors shall be installed early in the construction sequence to ensure that such performance is optimized.
4. The order of precedence of building systems for the purposes of co-ordinating the installation shall be as described in Section 019010, and generally as follows:
 1. Building Structural System takes precedence over,
 2. Location of exposed devices and building elements in architectural elements such as ceilings, over
 3. Location of systems in exposed architectural locations over,
 4. Location of non-pressurized liquid systems functioning by gravity, over
 5. Pressurized liquid systems requiring maintenance drainage, over
 6. Pressurized air distribution systems, over
 7. Pressurized liquid and gas systems, over
 8. Electrical distribution systems.

5. Electrical Drawings do not show structural, architectural, and related details. Take information involving accurate measurement of building from building drawing notations, and also at building from existing conditions.
6. Properly plan, coordinate and establish the locations and routing of services with all Trade Contractors affected prior to installation such that the services will clear each other and any obstructions. Unless otherwise specified, the order of right-of-way for services is as follows:
 1. piping requiring uniform pitch
 2. piping 100 mm (4") diameter and larger
 3. large air ducts (main runs)
 4. electrical cable tray and bus duct
 5. conduit 100 mm (4") diameter and larger
 6. piping less than 100 mm (4") diameter
 7. smaller branch ductwork
 8. conduit less than 100 mm (4") diameter.
7. Furnish "built in" items in ample time and give necessary information and assistance in connection with building in of same. Notify Trade Contractor concerned in writing of size and location of recesses, openings and chases at least 48 hours before walls are erected, floors poured and similar work.
8. Where not sleeved, make holes through steel, concrete walls, floors and elements by hole drilling and concrete core drilling only. Verify location of structural reinforcing and concealed conduit and systems using appropriate methods such as x-ray, and obtain Consultant's acceptance before drilling. Under no circumstances core drill existing or new structural steel, precast, pre- or post-tensioned concrete structure without written acceptance of the Consultant for each individual location. Obtain a professional engineer's review and acceptance at no cost to Owner upon request of Consultant.

1.10. Reference Standards and Codes

1. The relation of the Work to Reference Standards and Codes is described in the General Conditions and Supplementary Conditions of the Contract, in Section 014020, and elsewhere in the Contract Documents.
2. Conform to the contract requirements, regulations, and legislation of authorities having jurisdiction, as in force where the Work is located, meeting the more stringent requirement in each situation.
3. Apply for, obtain, and pay for all permits and inspections required by authorities having jurisdiction, including electrical permits and ESA reviews where required by legislation, with the exception of the municipal building permit only.
4. Furnish necessary certificates as evidence that work installed conforms with laws and regulations of authorities having jurisdiction.
5. Conform to the recommendations of the organizations listed in Section 014020 for good practice, use standards and codes referenced wherever in the Contract, in whole or in part, in their most recently revised or amended form, as specifically requested in the Specification and as applicable in normal industry practice:
 1. to the performance of the Work,
 2. to the interrelation of Products and their components,
 3. to the installation of such Products and execution of related services.
6. Equipment and work provided under the Electrical Divisions shall conform to applicable standards and regulations of the following organizations:

1. Canadian Standards Association (CSA) Standards
 2. Underwriter's Laboratories of Canada (ULC) Standards
 3. Ontario Electrical Safety Code (OESC) and Bulletins
 4. Canadian Underwriters Association (CUA) Standards
 5. National Building Code (NBC) (except where in conflict with the OBC)
 6. Ontario Building Code (OBC)
 7. National Fire Protection Association (NFPA) Standards
 8. National Electrical Contractors Association (NECA) for Manual of Labor Units
 9. Electrical and Electronic Manufacturers Association of Canada (EEMAC) Standards
7. Minor changes required by an authority having jurisdiction shall be carried out without change to the Contract amount. Standards established by drawings and specifications shall not be reduced by applicable codes or regulations.
8. File Contract Drawings with proper authorities and obtain their approval of installation and permits for same before proceeding with work. Prepare and submit necessary detailed shop drawings & designs as required by Authorities. Any first submission of plans and specifications to ESA will be made by the Consultant where size of service or panels requires. From then on, and in the case where no preliminary submission has been made, the Electrical Trade Contractor shall be responsible for obtaining and complying with all the requirements of ESA.
9. Pay all fees in connection with examination of drawings, permits, inspections and final certificate of approval by authorities having jurisdiction. This includes premiums for after office hours and weekend /holiday inspections.

1.11. Quality Control

1. General requirements for quality control are described in Section 014050. Workmanship and method of installation shall conform to best standards and practice and be performed to acceptance. Work shall be done by tradesmen skilled in the aspect of the work they perform. Where required by local or other By Laws or Regulations, tradesmen shall be licensed in their trade. Install work and equipment to manufacturer's printed directions for this specific contract.
 1. Trade workers to have a Certificate of Qualification as Journeyman or Apprentice Registration for the Place of the Work or an Interprovincial Certificate.
 2. Ratio of journeyman to apprentice: not to exceed ratio in Apprenticeship Act of Ontario.
 3. Certificates and Registration must be provided to the Consultant on request.
 4. Maintain on-site an up-to-date record listing journeyman and apprentices working on site.
2. The Contractor, on request, will supply Trade Contractors with necessary levels and dimensions that are required to relate work described in the Electrical Documents. Maintain all lines and levels so given.
3. Tolerances for the installation of the Work are defined and set out in Section 014050 as well as elsewhere in the Documents and as established by manufacturers and suppliers of Products. Conform to the most stringent requirements.
4. Temporary or trial usage of any device, machinery, apparatus, equipment, system, or materials shall not be construed as evidence of acceptance of same by either Consultant or Owner. No claim for damage shall be made for injury to or breaking of any part of such work that may be so used. The Contractor remains responsible for all elements of the construction until final acceptance of the Work in its entirety.
5. Provide testing of components and systems wherever required by the Consultant, by applicable law, code or regulation, by authorities having jurisdiction, and where stated in the Documents. This includes factory and off-site testing as well as at the Place of the Work.
6. Submit in accordance with general provisions all written record reports of all tests and of all certificates from independent agents certifying compliance and acceptance, including preliminary reports and reports involving failed tests.

7. Rough copies of test reports must be submitted by facsimile to the Consultant within 3 business days of date of test. Final issued copies of test reports must be submitted within 14 days of date of test. Work upon which the tested component or system depends, and work to cover such systems or components, proceeds at the Contractor's and applicable Trade Contractors sole risk until review and acceptance of successful test certifications and reports by the Consultant.

1.12. Temporary Facilities

1. Temporary measures, required environments, and facilities for the performance of the Work are described in Sections 015010 and 015033. Conform to such requirements. The Contractor shall ensure such conformance and shall provide such measures and co-ordinate responsibility for such requirements among Contractor and Trade Contractors.
2. Each Trade Contractor is responsible to create suitable working environment for its workers and the products and materials being installed, and for protection of such products and materials prior and after installation until final acceptance of the Work, unless specific arrangements for such protection and environments have been made with the Contractor.
3. The Electrical Trade Contractor shall provide electrical work to the Contractor for the installation of temporary power and construction power. Electrical Trade Contractor and Contractor shall co-ordinate costs during the bidding period, to ensure temporary work for ways and means is understood and priced only once.
4. Provide temporary office, workshop and tools and material storage space as necessary for the electrical Work and assume responsibility for any loss or damage thereto. Buildings erected for this purpose shall conform in appearance to those erected for similar purposes under other Divisions of Specification.
5. Provide temporary lighting for whole construction area, to light levels commensurate with safety and the requirements of the Work. Coordinate with General Contractor for requirements.
6. Provide scaffolding and shoring necessary for work of the Electrical Part of the Work. Scaffolding and shoring shall be adequate to protect the workmen according to Provincial and Local Regulations.
7. Provide rigging and millwrighting, labour and equipment necessary for the Electrical Part of the Work. Employ only workmen well experienced and skilled in such trades for this portion of the work.
8. Provide hoisting machinery, operators, labour and materials necessary to lift and place equipment supplied under the Electrical Part of the Work.
9. The permanent systems or any part thereof shall not be used during construction for construction purposes, unless so permitted by the Owner in writing.

1.13. Safety Requirements

1. General requirements for safety are described in the General Conditions and Supplementary Conditions of the Contract, and in Sections 015045 and 015046.
2. Specific requirements for safety and operations in relation to existing conditions and the Owner's operations and facility are described in Division 1.
3. Conform in all respects to the requirements for safety described in the Contract Documents, and applicable legislation and regulations referenced therein.
4. Provide on all corners and edges of equipment, ductwork piping, hangers and obstructions mounted less than 2 m above floor in electrical type rooms, suitable pre-manufactured and purpose-designed foam rubber edge guards to protect persons from injury.

1.14. Environmental Protection

1. Measures and facilities for the protection of the environment during performance of the Work are described in Section 015060. Conform to such requirements. The Contractor shall ensure such conformance and shall provide such measures and co-ordinate responsibility for such requirements among Contractor and Trade Contractors.

1.15. Basic Product Requirements

1. Requirements for Products and supply of Products is described in Section 016010. Conform strictly to such requirements.
2. All equipment, controllers, and systems must restart automatically upon re-activation of electrical power, following power failure, and resume their sequence of operation without manual intervention.
3. Alternatives & Substitutions
 1. Throughout the Electrical Documents are lists of alternative manufacturers acceptable to the Consultant & Owner. These manufacturers have been deemed to have the ability to supply materials and product that meets the characteristics of the specified or described product or material item. Such products or materials may need to be customized or otherwise worked to achieve the characteristics required by the design and the Contract. The Contractor is cautioned that neither the Owner nor Consultant have made extensive investigation of the particular material or product characteristics of alternative manufacture to ensure that such products or materials meet the requirements of the Contract.
 2. Each Bidder may elect to use alternative products or materials from such lists, providing that the bidder investigate and determine any required changes or customization of the product or material necessary to ensure the performance of the building systems of which it forms part, its interrelationship with adjacent components, and achievement of the contract requirements.
 3. The Contractor and the Trade Contractor responsible for the building system in which a product or material is to be installed shall ensure alternative products fit space allotted, provides all specified features, and gives performance specified. If an alternate product or material is proposed by the Contractor or Trade Contractor and does not fit space allotted nor is equivalent to the specified product in Consultant's opinion, regardless that the manufacturer has been nominated as an accepted alternative manufacturer, supply of the specified described product will be required without change in Contract Amount or Contract Time. Only manufacturers stated as specified or as acceptable alternative will be accepted for the bidding of the Contract. All other manufacturers shall be quoted as a Bidder's Alternative on the bid forms in accordance with provisions within the bid forms, accompanied by requested information and stating conditions and credit amount that may be applied to the Bid Price upon acceptance of the alternative by the Owner.
 4. If a Product or material specified or described is unobtainable, the use of a proposed substitute Product or material shall be shown on the Bidder's Alternative section of the bid forms, together with an amount added or deducted from the Bid Price for its use. Extra monies will not be paid for substitutions after Contract has been awarded.
 5. If an item of a size or weight or capacity required by the Contract is unobtainable, supply next larger size or capacity or heavier weight without additional cost to the Owner.

1.16. Basic Execution Requirements

1. The general requirements for execution of the Work are described in Section 017010.
2. Each Trade Contractor shall:

1. Co-ordinate the execution and layout of out their work and be responsible for any damage caused to other Trade Contractors or Owner by improper location or carrying out of same.
2. Be responsible for prompt installation of work in advance of other portions of the Work upon which the Trade Contractor's work depends and to facilitate diligent and orderly progress of the Work.
3. Protect all finished and unfinished work and existing conditions from potential damage by performance of work described in the Electrical Part of the Work. Co-ordinate protection with the Contractor.
4. Be responsible for condition of material and equipment supplied. Be responsible for protection and maintenance of work completed until termination and acceptance.
3. Electrical Drawings are diagrams, and do not show the integrated construction required by the Contract. Take information involving accurate measurement of conditions from noted measurements on all Contract drawings, and at the Place of the Work, and verify all dimensions prior to performing work upon which such dimensions depend, wherever located. Make, without additional charge, any necessary changes or additions to runs of piping, conduits and ducts to accommodate existing conditions and the requirements of other parts of the Work. Route systems for best appearance, neat and straight in conformance with structural and architectural elements. Location of conduits, devices and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material. Do not scale drawings.
4. As work progresses and before installing finish devices and elements of systems such as outlets, luminaires, sensors, fixtures and other fittings and equipment that may interfere with interior treatment and use of building, obtain detailed instructions for exact location of such equipment and fitments. Ensure that installation of finish devices and equipment is performed upon completion and acceptance of surrounding finished elements.
5. Electrical Drawings indicate general location and route of conduit, devices and fixtures that are to be installed. Where required work is not shown or only shown diagrammatically, install same to conserve headroom (minimum 7' 3" or 2200 mm clear) and interfere as little as possible with free use of space through which they pass. Conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical. Install work within partitions at highest practical height to maintain free area for Owner's future alterations to partitions. Provide minimum service clearances as shown in drawings, as required by applicable Codes and Standards and manufacturer's recommendation. Where no written guidance exists, maintain minimum 24" (600 mm) service space around serviceable units and as required for maintenance access and replacement of internal components.
6. Install conduit and devices to clear structural members and any fireproofing or rated assemblies that are to be applied to such members. Locate electrical work to permit installation of specified insulation. Do not remove or damage structural fireproofing or protections. Suspended elements or units of other construction shall not be obstructed from easy removal by interfering pipes, ducts, conduits or any other obstruction below the units.
7. Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels and dimensions to ensure proper and correct installation. Verify exterior utility services.
8. Locate all electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.
9. In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose. Do not proceed in uncertainty.

10. Relocate equipment and/or material installed but not co-ordinated with work of other Sections as directed, without change in the Contract Amount or Time.
11. All components of equipment must be installed to be easily accessible for service. Consult with Consultant if intended design layout has to be modified to maintain service access shown on manufacturer's instructions or drawing details for component installation. As described elsewhere in this Section, co-ordination and planning of layouts, together with submittals and review of all conditions of the Work is a requirement of this Contract.
12. Securely plug or cap open ends of electrical raceways or equipment to prevent entry of dirt, dust, debris, water, snow or ice. Clean all equipment inside and outside before testing.
13. Equipment stored on site shall be protected from weather and kept dry and clean at all times. Take care to avoid corrosion of metal parts.
14. Protect work installed from damage. Secure all unfinished or loose work to prevent movement.

1.17. Cleaning and Construction Waste Management

1. Requirements for cleaning and the management of construction waste and recyclable materials during the progress of the Work and at the various stages of final completion of the Work are described in Section 017041 and 017042.
2. Without exception and in addition to any requirements of the Contractor, each Trade Contractor is responsible for cleaning the Place of the Work on a daily basis to ensure that all effects of its construction operations and execution of the aspect of the work for which the Trade Contractor is responsible achieve the orderliness and cleanliness of the Place of the Work required at the end of each working day. Each day, Trade Contractors shall remove from the Place of the Work surplus materials and debris resulting from the Trade's activities. Keep work areas clean and in a workmanlike manner at all times to acceptance of the Contractor, Consultant and Owner.
3. The Consultant may issue instructions to the Contractor to clean or manage waste and recyclables in accordance with Contract requirements whenever deemed necessary, including for special cleaning by outside cleaning forces at Trade Contractor expense.
4. Immediately prior to completion of work:
 1. Remove all dust, dirt and other foreign matter from internal surfaces of enclosed electrical apparatus and equipment.
 2. Remove all temporary protective coverings and coatings, temporary labels.
 3. Clean, repair, lubricate and adjust all mechanism and moveable parts of apparatus and equipment leaving it in new condition and operating properly.
 4. Balance demand loads for service and distribution feeders within 5 percent upon completion of work and after the building is in full operation.

1.18. Contract Closeout

1. Requirements and definitions for identification of defects and deficiencies, correction of same, substantial performance of the Work, and completion of the Work are described in Section 017070. The Contractor and all trade contractors shall conform to these in all respects.
2. The Contractor, and more particularly the Trade Contractors performing work to building systems, are cautioned that accomplishment of the Work involves both construction and related services. The related services have monetary value within the contract amount, and failure to perform related services in a timely manner to facilitate completion of the Work shall result in a finding of defective work by the Consultant, with related deduction of such monies from the Contract Amount.
3. Provide receipts from designated representative of Owner for portable and loose materials.

4. Application for final review will be considered when the Work has been completed and written declarations submitted that all commissioning, testing adjustment, set up and documentation is complete. Consultant's final review shall be done when:
 1. All reported deficiencies have been corrected.
 2. All systems have been balanced, tested, commissioned and are operational.
 3. The Owner has been instructed in the operation and maintenance of all equipment.
 4. All reports have been submitted and reviewed.
 5. All maintenance manuals have been submitted and reviewed.
 6. All tags and nameplates are in place and all data submitted and reviewed.
 7. Cleaning up is finished in all respects.
 8. All certificates are furnished.
 9. All spare parts and replacement parts specified have been provided.
 10. All record drawings have been submitted and reviewed.

1.19. Commissioning

1. Start-up, commissioning, and final commissioning are defined terms within this Contract, as described in Section 018010. No industry practice or common understanding shall detract from the definition of these terms as set out therein.

The Contract requires that each Building System be overseen by a System Commissioner, who shall be an authorized representative of the trade contractor responsible for the system. The System Commissioner shall perform all functions as assigned in Division 01, working in cooperation with the Contractor's Commissioning Co-ordinator.

2. The Contractor and all Trade Contractors shall start up components, perform commissioning of systems, and perform final commissioning of systems as described in Section 018010 and elsewhere in the Contract Documents for particular systems, including all aspects of their operations. Where these operations are not performed to the satisfaction of the Consultant, by their sole criteria and judgment, perform or re-perform these requirements at no additional cost to the Owner as many times as instructed and as necessary to achieve the complete commissioning intent of each system and other systems upon which the system depends.
3. Separately start up all electrical equipment and commission each system and then all related systems through all cycles and seasons.
4. Instruct Building Operators in repair, maintenance and operation of systems and equipment.
5. Arrange for on-site instruction by any product manufacturers where considered necessary by Consultant, or requested in the Contract Documents, at no additional cost to Owner.
6. Test systems to the satisfaction of the Consultant, and as required to establish compliance with plans and specifications, and with the requirements for the Supply and Inspection Authorities.
7. Faulty and defective equipment shall be replaced with new materials. Conductors that are found to be shorted or grounded, or to have less than proper insulation resistance, shall be replaced with new conductors.
8. At time of final commissioning, and in addition to other aspects of commissioning work, re-torquing all bolted connections in all distribution equipment
9. Tests shall include but are not limited to the following:
 1. Test of secondary voltage cables shall include megger tests to establish proper insulation resistance, and phase to ground resistance of cables.
 2. Proper functioning of all systems.
 3. Polarity tests to establish proper polarity connections to all sockets and receptacles.
 4. Test of system neutral to establish proper insulation resistance and isolation of neutral from ground except for required ground connection at Service.

5. Calibration all aspects of systems and components to ensure optimal function.
10. Trial usage of any equipment or materials shall not be construed as evidence of acceptance of same and no claim for damage shall be made for injury to or breaking of any part of such work which may be so used.
11. Provide all work for equipment start-up, system start-up, commissioning, and final commissioning of building systems described in the Electrical Part of the Work, in accordance with requirements described in Division 1.
12. The Electrical Contractor shall carry in their bid the cost for all performance testing of equipment and systems. This includes all equipment, labour, instruments, expenses of the manufacturer's representative, and incidentals, and all power and fuel.
13. Submit the record of all tests and have these tests signed by Consultant or Contractor's Superintendent and, where applicable the manufacturer's representative. Show in schedule form a record of the systems or parts of systems tested, the date of the test, the circumstances such as current, temperatures, etc., the duration of the test and any special remarks pertaining to events during the test. Note which tests have been witnessed by authorities having jurisdiction.
14. Submit certification letters from the manufacturers of all equipment certifying that their technical representatives have inspected and tested their equipment and are satisfied with the methods of installation and operation. Where existing systems are extended and or modified, provide letters covering both new and existing equipment and connections. These letters shall state the names of persons present at testing, methods used and a list of functions performed with location and room numbers where applicable.
15. Arrange for on-site instruction by various Manufacturers where considered necessary by Consultant, at no additional cost to Owner.

1.20. Record Documents

1. The general requirements for photographic record of the installation of the Work, as-built drawings, and record drawings are described in Section 018040. Conform to these requirements.
2. Independently of the Contractor and the documents required by Section 018040, the Electrical Trade Contractor shall obtain and pay for at least 2 sets of black-line white-prints upon which to clearly mark locations and installation of the systems components as work progresses, changes and deviations from conduit and equipment shown so that on completion Owner and Consultant will have records of exact location of these components. Locate exterior buried work by dimension from building including final top and invert elevations. Submit as-built drawings to the Contractor for inspection and acceptance prior to creating record drawings of the building systems, and prior to application for substantial completion.
3. The Contractor shall ensure that as-built information is accurately recorded and shall check same as the work progresses. As-Built drawings shall be reviewed with Consultant at each job-site meeting.
4. Record Documents shall include the following information in addition to requirements set out elsewhere:
 1. Location of all services embedded in the structure, utilizing references to existing structure.
 2. Dimensioned locations of all services left for future work.
 36. All changes to the Work due to Change Orders and Site Instructions.
 4. All changes to the Work during construction.
 5. All changes to architectural elements that affect the backgrounds of this record set.
 6. Locations of all electrically supervised valves, flow switches and pressure switches.
 7. Location and designation of all items requiring access or service in a hidden location.

8. Location of all access doors provided for the Electrical Part of the Work.
 9. All changes and revisions to specifications, details and equipment schedules.
 10. All home-run conduits, junction boxes for complete electrical systems.
5. Upon completion of Contract Work, prior to Substantial Performance inspection, and after final review with Consultants, all Trade Contractors shall, in cooperation with the Contractor, neatly transfer recorded information and make final record submission to Consultant as follows:
1. One (1) set of clean, legible prints.
 2. In the form of electronic CAD drawings as set out in Section 018040.
6. Consultants shall review As-Built information provided by Contractor. Contractor and Trade Contractors shall revise drawings to suit any comments until acceptable to Owner.

1.21. Warranties

1. The Contractor and all Trade Contractors are specifically cautioned that all warranties relating to products and execution shall be in accordance with Section 017080. All warranties shall commence from the date of Substantial Performance of the Work, or the formal acceptance by the Consultant and Owner of the complete building system of which a product or component forms part, regardless of the startup date of such item, whichever is later.
2. The Contractor and all Trade contractors shall collect from their SubContractors and Suppliers all Guarantees/Warranties specified in the Contract Documents, in the form specified, and in addition all standard warranties offered by product manufacturer's whether specified or not. The Contractor and all Trade Contractors are specifically cautioned that the proper provision of warranties is required by the related services noted in Contract Close-out above.
3. The Contractor and each trade contractor assigned responsibility for a Building System shall provide a one year warranty to the Owner for the specific Building System, in accordance with the General Conditions of the Contract, as modified by the Supplementary Conditions.

1.22. Maintenance Manuals and Materials

1. The general requirements for the organization, formatting, and contents of Maintenance Manuals and the provision of maintenance materials is described in Sections 018050 and 018060 respectively. All Trade Contractors are responsible for collecting completing all submittals, shop drawings, instructions, data, operating instructions, trouble-shooting instructions, parts list, parts diagrams, evidence of all tests, maintenance manuals, valve tags and similar directories, balancing reports, and any other information requested in the Contract Documents, to assist the Contractor in assembling this information in neat manuals. All information must be in interactive PDF format. No scans of documents will be accepted.
2. The Contractor shall be under no obligation to forward monies certified by the Consultant for the progress draw immediately prior to Substantial Completion, or for Substantial Completion, where a Trade Contractor is substantially deficient in the performance of duties related to warranties, manuals, and submittals.
3. Additional Requirements for the Electrical Maintenance Manuals (see also Division 1)
 1. The manuals shall include complete operating instructions, installation, cleaning and lubricating procedures, preventative maintenance procedures etc., for each piece of equipment or system installed under the Electrical Part of the Work. This information, instructions etc., shall be prepared by the individual equipment manufacturer and as supplement by the manufacturer's designer if, and when, necessary.
 2. The manuals shall include a general arrangement of shop drawings, detailed drawings, applicable operating curves, etc. A complete parts list of assemblies and component parts for all equipment shall be provided, and shall include a recommended spare parts list, quantities, etc., showing the manufacturers name, catalogue number and closest supplier.

3. All data supplied shall be pertinent to the specifics of the equipment installed and shall not be considered acceptable if the data is of a general nature.
4. Within the period prior to acceptance of the Work, the Owner's personnel shall be instructed in the proper operation and maintenance of the systems and equipment installed. The instruction period shall be of sufficient duration to fully familiarize the operating personnel with the systems and equipment. The Owner's personnel shall be instructed in all aspects of the systems and equipment being accepted. The Contractor and Trade Contractors shall include all costs for such instruction to the satisfaction of the Owner, without limitation.

1.23. Contract Requirements for Building Systems

1. Definition:

1. *Control.* For clarity, the definition of control is referenced herein, as set out in Section 019010, Building Systems Requirements. In summary, control means a method by which a component of a building system is instructed to perform the operations and functions to fulfil the requirement and intent of the building system. All systems require control as an integral part of the Work. Controls shall have a similar meaning.

There is no Building Monitoring System (BMS) required by the Work, for control of other building systems, or for future integration of building monitoring systems by Owner. In some cases systems may perform monitoring or sensing functions and provide data to the Owner. Such systems are not a BMS. Responsibility for all control requirements resides within particular building systems work. Provide all control at no cost to Owner and do not rely in any way upon equipment features that allow for BMS installation or control.

2. Provide all work and services required to achieve the design intent and standards for detailed design, procedures, products, systems, and execution of the Building System as it can reasonably be inferred from the documents, including its proper and co-ordinated relation to other Systems, at no additional cost to the Owner.
3. Provide all materials, products, work and services required to achieve the design intent and standards for detailed design, procedures, Products, systems, and execution of the Building System as it can reasonably be inferred from the Contract Documents, including its proper and co-ordinated relation to other Systems, at no additional cost to the Owner.
4. Building Systems requirements are further described in Section 019010, together with assignment of responsibility for Building Systems to the Contractor and specific Trade Contractors. Trade Contractors performing work described in this or other Electrical Divisions shall perform all obligations for Building Systems as assigned. All Trade Contractors shall carefully inspect these requirements, and shall incorporate all such requirements into their work, price, and contractual obligations with the Contractor.
5. The Contractor and trade Contractors are specifically cautioned that the contract requires detailed design, layout, and co-ordination services to ensure that the performance intent of the design prepared by the Consultant is achieved in the finished Work for each and all Building Systems. This requirement has monetary value as part of the Contract Amount. Failure to perform this requirement shall result in a reduction of the contract amount as found by the Consultant, regardless of the performance of other required aspects of the Contract.
6. Drawings for Building Systems are schematic diagrams only, and do not govern the amount of work, product, or material required to achieve conformance with Contract requirements.

END OF SECTION

1. GENERAL

1.1. General Instructions

1. Comply with the requirements of Section 260500, Electrical General Work Requirements, as if repeated herein.
2. This Section specifies products, common criteria and characteristics, and methods and execution that are common to one or more aspects of the Electrical Specifications and drawings. It is intended as a supplement, and is to be read accordingly.

1.2. Building System Requirements and Sequences of Operation

1. Provide all materials, products, work and services required to achieve the design intent and standards for detailed design, procedures, Products, systems, and execution of the Building System as it can reasonably be inferred from the Contract Documents, including its proper and co-ordinated relation to other Systems, at no additional cost to the Owner.
2. Comply with the requirements of Section 260500 and Section 019010, and requirements set out for particular Building Systems in the Specification.
3. The Contractor and all Trade Contractors are specifically cautioned that the Contract requires work and services to achieve the performance and intent of the Building Systems identified in Division 1 of the Specification, including but not limited to emergency egress systems, fire separation systems, barrier free access systems, and other systems that are created by the finished Work.
4. The Electrical Trade Contractor shall provide and include all costs for conduit, junction boxes and 120V side wiring connections for the following systems:
 1. Door Access Control Systems and related devices;
 2. Auto Door Operators and associated controls, to suit the requirements for the operator and its control devices including appropriately sized junction boxes within accessible ceiling spaces;
 3. Datacom, Telecom, Public Address and other Communications Systems, as set out in Division 27 and on drawings;
 4. Intrusion Detection, Surveillance, and Security Systems, as set out in Division 28 and on drawings; and
 5. All other systems rough-in work described on Electrical Drawings.

1.3. System Coordination and Short Circuit Study – Not required this project

1.4. Arc Flash Protection – Not required this project

1.5. Testing and Commissioning of Systems

1. Provide all materials, products, work and services required to balance, test, and adjust Building Systems to achieve specified performance, at no additional cost to the Owner.
2. Commissioning requirements are described in Section 260500 and Division 1 of this specification, as well as in particular sections for each Building System.

2. PRODUCTS AND EXECUTION

2.1. General Materials and Products

1. Materials for this Contract shall be of high quality of their respective kinds and of uniform

pattern throughout, in accordance with the requirements of Section 016010 and as further specified or noted for specific materials and products.

2. Install all materials and products to Consultants acceptance and requirements of Section 017010 and as further specified or noted for specific materials and products.
3. Install all materials and products parallel to building lines, whether exposed in the finished Work or not. Obtain clarification and acceptance of proposed routing of systems from Consultant. Do not proceed in uncertainty. Do not feed devices in walls by wiring horizontally from one to the other more than 1m. Feed each device vertically from accessible ceiling spaces to allow for Owner renovation and new openings without interference from electrical distribution.
4. Electrical materials shall be C.S.A. approved and be so labelled. Material not C.S.A. approved shall receive acceptance for installation by Ontario Hydro Special Inspections Branch before delivery, and modifications and charges required for such acceptance shall be included in work described in this section. Material shall not be installed or connected to the source of electrical power until acceptance is obtained.
5. Acceptance of products installed presumes that products have not been damaged or exposed to conditions that would adversely affect performance and life expectancy. If in the opinion of the Consultant, materials or Products have sustained damage, or have been exposed to abnormal conditions it shall be the responsibility of the Trade Contractor supplying such materials or Products to have independent tests performed as deemed necessary by the Consultant to establish condition and their acceptability for incorporation into the Work.
6. Products shall be designed and manufactured in accordance with latest issue of applicable Standards or Authorities when such are either mentioned herein, in Division 1, in Section 260500, or have jurisdiction over such materials or items of equipment. Confirm capacity, ratings and characteristics of products being provided to supply power to equipment provided under other Sections of the Work. Resolve discrepancies before such items are ordered.

2.2. Excavation and Backfilling – N/A this project

2.3. Penetrations of Environmental Separation System, Structural Members, Cutting and Patching – N/A this project

2.4. Vibration Isolation Requirements

1. Ensure that the vibration induced by electrical Building Systems and their components does not result in any sound level in excess of the levels as defined in the ASHRAE Guide and Data Book, and does not result in physical discomfort to the occupants as solely determined by the Owner.

2.5. Painting and Identification Marking

1. All non-factory painting and applied finish coatings, whether site or shop applied, shall conform to the requirements described in Division 9 as if repeated herein, and additionally as described herein.
2. In general, all operating devices and equipment shall be supplied with factory-applied finish coatings as installed and warranted by the manufacturer. Choice of colour shall be by Consultant from standard offered ranges of colour from the manufacturer.
3. Supply all equipment and materials fabricated from iron or steel (except conduit and related boxes of galvanized finish) prime painted at factory before shipment. Minimum quality of primer, wherever installed, shall be as described in Division 9 for the specific material noted. If primer is damaged or the unit requires alteration for holing in shop or site, the Trade Contractor shall touch up with primers to match factory-priming and leave ready for painting. All auxiliary support steel described in the Electrical Divisions shall be supplied as described in

Division 5 for Miscellaneous Metals, together with prime finishes identified therein.

4. Where not factory-finished by a manufacturer, all metal parts, miscellaneous metal items and work installed exterior to building must be degreased and prime painted unless G90 or Z275 galvanised. Wipe-coat galvanizing or standard galvanizing is not acceptable except where such item is scheduled in the Contract Documents to receive site finish priming and painting.
5. Finish painting of bare conduit, accessories, and unfinished surfaces of equipment is described in Division 9 and as otherwise noted in the Electrical Divisions. Where items are noted for field finishes, leave work in clean, paintable condition to the acceptance of the Painting Trade Contractor.
6. Exposed conduit will be painted in Owner's standard colours where exposed in the finished work to areas scheduled for architectural finish unless otherwise required by Code or Bylaw. Fire alarm junction boxes shall be painted red to unexposed areas and all areas not scheduled for architectural finishes, and this painting shall be by the Electrical Trade Contractor and shall be performed in accordance with the field painting requirements described in Division 9. Co-ordinate painting and identification markings so markings are coloured for clear visibility.
7. Identification markings and coding are described in the Electrical Divisions, and shall be performed by the Trade Contractor responsible for the Building System to which such markings and coding applies. Install markings and coding after acceptance of finishes, to locations required by specification and to facilitate identification of systems in accordance with requirements of authorities having jurisdiction and this specification, including to concealed spaces. Co-ordinate the timing of application of such markings to suit progress of the Work.
8. Identify outlet boxes on the reverse side of box cover with: circuits contained in the box, the panels from which they are fed, the voltage and purpose of the outlet.

2.6. Welding and Hot Work

1. In every case of welding or hot work temporary protection and fire protection shall be designed and provided by the Trade Contractor performing the welding or hot work in accordance with Division 1 requirements and as necessary to eliminate the risk of fire hazard from such operations. Notwithstanding the responsibility for temporary protection that remains solely with the Contractor, every field welding operation required by the Work includes a written report assessment submitted by the Trade Contractor and Contractor that identifies the potential fire risks and potentially flammable or combustible materials at and adjacent to the proposed location of the work, or that may be affected by the welding or hot work. The assessment shall detail the methods by which the potential fire risks are to be eliminated. Operations shall be in accordance with the requirements of the reference information and existing conditions contained in the Contract General Conditions, Supplementary Conditions, and Existing Conditions documentation.

2.7. Bases, Supports, and Fasteners

1. All bases, supports & fasteners shall conform to the requirements of Div. 1 as if repeated herein.
2. In general the Trade Contractor installing a device, product, component, or material shall design and provide all fastenings, brackets, supports, bases, stands and platforms necessary for their installation to meet the requirements and performance noted in Division 1 and reference material, taking into account the characteristics of the component and the Building Systems of which it forms part, the recommendations of the component manufacturer for the specific installation location, and all existing conditions and conditions of service life.
3. This Contract requires the design and provision of all securement, anchorage and other fastenings necessary for the installation of the Work, using good practice and principles for such design identified in Division 1. Design of fastenings shall assume 50% failure of fasteners in each load transfer condition (compression, tension, and shear). By way of illustration, for a bracket with fastening plate subject to tension in top fasteners, compression in bottom fasteners,

and shear transfer in all fasteners, such bracket must be fastened with a minimum of two top fasteners and two bottom fasteners each capable of fully accepting the imposed design load to allow for failure of one of the fasteners in each condition.

4. Construct concrete housekeeping bases at least 4" (100 mm) high (or as otherwise noted), of minimum 32 MPa air-entrained concrete with non-slip trowel swirl finish in compliance with requirements for concrete work described in Division 3 to support of floor mounted equipment of any kind, except where specifically noted in the Contract Documents that such bases are not required. Size bases 2" (50 mm) larger than base of apparatus with outside corners chamfered 1.5" (38 mm). Grout motors and equipment to their bases to acceptance of Consultant.
5. All supports and fasteners shall be designed to minimize vibration transfer from operation of systems and anticipated conditions of service life.
6. Design and install supports so that system components can be adjusted after initial erection to achieve tolerances, be true in respect of alignment and grade, and allow controlled movement in accordance with Division 1 requirements for quality and to optimize the performance of the system in the conditions of anticipated service life. Provide such adjustments to optimize the installation immediately upon acceptance of tests during system rough-in.
7. Responsibility for the design and provision of supports and fasteners rests with the Trade Contractor installing the Building System that requires such support, until the forces imposed by the system components are correctly transferred to components of the building structural system at locations capable of accepting such transfer. The Building System Trade Contractor is responsible for evaluation of the structural Building System components and shall propose in writing the forces and locations of such proposed transfer, for acceptance by the Consultant. In general, the structural Building System is composed of load-bearing concrete and masonry assemblies, structural steel, load-bearing studs and framing, and structural steel deck. Such components are identified on the structural drawings. The Trade Contractor may not transfer forces to structural steel roof deck, or elements not shown on structural drawings such as non-load-bearing masonry and framed partitions, suspended ceilings, and other similar items of the Work or existing conditions without the written acceptance of the Consultant, and only then for conduit, minor, and "end of system" devices of the Building Systems with flexible connections, such as luminaires weighing less than 42 lb. (20 kg.)
8. Use of explosive- or percussion-type fastenings of any kind shall not be used without prior acceptance in writing from the Consultant.

2.8. Hangers & Structural Framing Support

1. Hangers and structural framing supports are forms of support that are required by this Contract and shall be provided in accordance with the following particular requirements as well as the general requirements for supports and fasteners noted above.

The Contract requires that each Building System Trade Contractor shall design and provide all systems of hangers, raceway, and wiring channel to support unburied lengths of conduit, equipment, and any other components of the Building System for which the Trade Contractor is responsible. Obtain acceptance of methods of hanging and structural support to building before proceeding. Submit to the Consultant a proposed support method for all components of the Building System. Ensure that imposed design loads on the building structural system do not exceed maximum services loading shown in the Documents or as allowed by Consultant acceptance. Take special care to avoid introduction of undue reaction forces, sound transfer, movement and vibration into structure of building, from motors, transformers, or other equipment.

2. Structural framing support shall be by Allstrut or Unistrut and shall incorporate all accessories required to accommodate conduit and raceway support as specified herein. Size members, rod, and anchorage in strict accordance with manufacturer's design tables, to support anticipated loadings. Allow 20% further loading on supports where space is left for Owner's subsequent additional use.

3. Support conduit in accordance with most stringent requirement of Ontario Electrical Safety Code, other regulations, or this specification.
4. Where conduit is grouped, locate support spacing by smallest size conduit.
5. Provide separation material and effective barrier to ensure no contact between incompatible materials in other portions of the Work or existing conditions.
6. Support hangers with threaded mild steel hanger rods sized in accordance with hanger manufacturer's tables. Design and provide fastening to building structure by embedment of purpose-made male-female lag screw thread adaptors into wood construction, by inserts into concrete, by beam clamps on to structural steel work, or by bolts or welding, all in accordance with support and fastener requirements described in this Section. For equipment support, only where inserts are incorrectly cast-in may surface-fastened anchors be used.
7. Support equipment on load-bearing walls with anchors designed and sized to suit conditions. Fastening to load-bearing stud assemblies will only be permitted where fasteners impose loads directly to studs, and not to intervening wall surface components.
8. Where structural bearings do not exist in the structural Building System or existing conditions, provide miscellaneous steel angle or channel of sufficient size from other structural bearings to support hangers or equipment. Design and provide this support in accordance with Division 5 requirements for miscellaneous metals. The Contractor and Trade Contractor are cautioned that such miscellaneous metals are not shown on drawings of any kind, but are required by the Contract.
9. Plastic cable tie, wire, chain, strap or extension bar hangers are not acceptable for conduit or armoured cable installation under any circumstance.
10. Hangers shall be arranged so as to load structural steel in a concentric manner. Loads to be imparted on joists shall be imposed within 6" (150 mm) of panel joints, to top chord of steel joists only.
11. Support conduits for at least 6'-6" (2000 mm) from isolated equipment or devices with Burgess Vibro Acoustics or equal "SH" isolators with steel spring having 1" (25 mm) minimum static deflection and series connected elastomer element having static deflection of ¼" (6 mm) underload, or use flexible connections.
12. Support fixtures independently of ceiling suspension systems. Provide additional supports as required, which shall be fastened to building structure steel members, joists, beams, etc., but not metal pan or decking unless the Trade Contractor's proposed detail involves fastening to an appropriate number of deck flutes using Uni-strut or equivalent, and only then when accepted by the Consultant.

Material for additional supports and their installation shall comply with requirements of U.L.C. Refer to "List of Equipment and Materials" Vol. 2, and "Supplement" for application to rated assemblies.

13. Support outlet and junction boxes independently of the conduits running to them. Support suspended fixtures and devices independently of the wiring junction boxes that serves them, unless the device is specifically mounted directly to the box without extension of any kind.
14. Provide recessed luminaires with support frames, and additionally with plastering frames where set in drywall, plaster, or similar ceilings.

2.9. Sleeves, Firestopping, and Sealant Work

1. Where system conduits pass through masonry walls or concrete, supply 1.3 mm galvanised steel sleeves to the trade contractor constructing such elements, and locate the sleeve. Size sleeves through fire separated assemblies specifically in accordance with clearances for

firestopping designs that are selected and provided by the Firestopping Trade Contractor.

2. Through exterior waterproofed assemblies use heavy weight cast iron pipes machine cut. Extend sleeves 100 mm (4") above finished floors, and cut flush with underside of floor.
3. For rectangular duct openings for bus ducts and cable tray use minimum 18 gauge galvanized steel sleeves or provide a removable wood box-out of the required size. Brace sleeves to retain their position and shape during the pouring of concrete and other work.
4. Sleeves on buried conduit shall be 2" (50 mm) larger all round than conduit and be filled with 2" (50 mm) thick mineral wool insulation by Roxul or equivalent. The Trade Contractor installing the conduit shall caulk full perimeter of joints both interior and exterior with sealants to the requirements described in Division 7.
5. Firestopping and smoke protection work is described in Division 7. All trade contractors shall co-ordinate and cooperate with the Contractor in the contractual division of the Work so that firestopping is provided by a single manufacturer's ULC and local authorities accepted firestop systems to achieve the requirements of the fire separation systems identified in the Work.
6. No allowance shall be made for lack of sleeves or firestopping to existing portions of systems, as a reason for not providing such sleeves and firestopping in new work.
7. The work of this Division includes the provision of firestopping of new penetrations through new fire separations.
8. Sealant work is described in Division 7: All trade contractors shall co-ordinate and cooperate with the Contractor in the contractual division of the Work so that sealant is provided by a single manufacturer's sealant to achieve the caulking and sealing requirements identified in the Documents, and to properly achieve sealing in existing conditions, regardless that sealant work shall be performed by each Trade Contractor for his portion of the Work (except to penetrations of exterior envelope, which shall be by the responsible Trade Contractor for the envelope). This work includes, but is not limited to, sealing of all holes and openings for system components passing through floors and into shafts to a watertight condition. In firestopped conditions, sealing requirements may be accomplished by the firestopping work upon acceptance by the Consultant.
9. The Electrical Trade Contractor shall caulk spaces between conduit, cables, raceways, cabletrays with "Cerafibre" 2300 F packing and obtain Authorities approval and Consultant acceptance. Pack and seal both sides of openings with Electrovert "Flameseal" putty, minimum thickness 25 mm (1").

2.10. Access Panels and Doors

1. Each Trade Contractor responsible for a Building System described by the Electrical Divisions shall supply for all required locations, and in a timely manner, a 1/8" (2.8 mm) thick hinged metal access doors with frames suitable for the particular assemblies into which they shall be installed, for all access points in the system. The access doors shall be installed by the Trade Contractor that installs the assembly through which access is required.
2. Number and locations for access are not shown on drawings, and include but are not limited to locations in walls or ceilings to permit access to built in or inaccessible equipment, service points, controls, open raceways that are likely to accommodate future wiring, junction boxes, and components requiring access for inspection or maintenance by applicable regulation or code. Where lift out acoustic panel ceilings are used, access doors are not required but where requested by the Consultant panels shall be secured with accessible hold down clips and marked with Bildemup #6RH brass paper fasteners inserted through boards and bent over. Paint heads with red enamel before installation.
3. Access doors shall be equivalent to Stelpro Ltd. #722 flush type of size to suit ease of access to controls, boxes, or components serviced, minimum size 16" by 12" nominal (400 mm x 300 mm)

"Reach in", 16" by 24" nominal (400 mm x 600 mm) "Crawl in", with prime coat finish, concealed hinges, screwdriver lock and plaster key. Access doors in finished masonry or drywall construction shall be #722 less plaster key. Access doors shall be #726 in acoustic tile ceilings; #704 in drywall ceiling and #726E in plaster ceilings.

4. Access doors in fire rated ceiling assemblies, all fire rated walls, duct shafts or in corridor walls shall be UL, ULC or WHI listed 1 1/2 hour fire rated access doors equivalent to LeHage #L1010, Nailor Hart #0900 or Acudor #150B with screwdriver lock.
5. Acceptable Manufacturers:
 1. Smille, McAdams & Summerlin Ltd.
 2. Mifab (Modular Equipment Mfg. Inc.)
 3. Can Aqua Inc.
 4. Acudor Products Ltd.
 5. LeHage (Ancon Industries Ltd.)
 6. Nailor Hart Industries Inc.
6. Upon award of Contract, Trade Contractors and the Contractor shall co-operate to select a single manufacturer for access doors throughout the Work, for consistent appearance.
7. Provide the appropriate Trade Contractor with all pertinent information for installation. Ensure that all panels and doors are flush mounted and properly aligned with building modules and grids. Indicate locations on record drawings.
8. The work shall be laid out and installed to maximize the location of junction boxes within common corridors and spaces, and to areas of the Facility served by open ceilings or lay-in panel ceilings. Minimize requirements for junction boxes and access to areas of wallboard ceilings and walls or other ceilings or walls so that the need for access doors and panels is eliminated wherever possible.

2.11. Raceways and Fittings

1. Drawings do not show all raceways. Those shown are generally in diagrammatic form only.
2. Conform with the recommendations and requirements of the latest editions of the following:
 1. CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 2. CSA C22.2 No. 45, Rigid Metal Conduit.
 3. CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 4. CSA C22.2 No. 62, Surface Raceways and Lighting Fixture Raceways and Fittings.
 5. CSA C22.2 No. 83, Electrical Metallic Tubing.
 6. CSA C22.2 No. 126, Cable Tray System.
 7. CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.
 8. CAN/CSA C22.2 No. 227.3, Flexible Non-metallic Tubing.
 9. CSA C22 No. 18, Outlet Boxes, Conduits Boxes, Fittings and Associated Hardware.

Conduit Work

1. Wire and cable shall be installed in conduit throughout the Work, except in limited circumstances as stated in this specification, using conduit with approved fittings as follows herein. Provide bushings on the ends of all conduits in enclosure, boxes, panels and cabinets, to protect the conductor installation. Except where grounding bushings are specified use all plastic insulated bushings temperature rating 150°C with double locknuts. .10 Install all locknuts and bushings to ensure a secure mechanical and electrical bond. Use Erickson couplings in lieu of running threads.

Bx may be used from junction box to luminaire where junction box is located in accessible ceiling and run to luminaire is less than 10' (3 m).

Bx may be used to feed power outlets in partitions from locations in accessible ceilings where run of Bx within ceiling space does not exceed 15 feet (4.5 m) provided that installation of Bx is fastened to support at not more than 1 m intervals.

2. Rigid galvanized steel conduit shall have threaded IPS fittings, of steel or malleable iron. Threadless, die cast or pressure cast fittings are not acceptable. Rigid steel conduit shall be used:
 1. Where noted and required by regulations
 2. For all conduit work exposed in the finished Work
 3. To all hazardous areas
 4. On the exterior of building
 5. Where system may be exposed to mechanical damage
 6. Where conduits turn up or turn down out of concrete slab
 7. At all potentially damp and wet locations.
3. Conduit embedded in concrete or buried below grade floors shall be CSA approved rigid PVC type. Do not embed conduit in concrete slabs-on-grade unless it is impossible to provide required electrical services in any other manner. Obtain Consultant's approval for any such embedment. Where expressly permitted in such slabs, use rigid thick wall p.v.c. conduit with fittings. Such conduit shall not be used for exit light, emergency light, emergency power, or fire alarm systems or components. Otherwise, subject to required uses of rigid conduit and EMT, such conduit may be used:
 1. In slabs with rigid steel galvanized turn-up;
 2. Underground with rigid steel galvanized turn-up; and
 3. In concrete walls.
4. In areas where conduit will be exposed to corrosive atmospheres, use rigid P.V.C. or approved equal conduit and fittings only after discussion and acceptance by Consultant, saving only areas where this is not permitted by Code.
5. Steel galvanized electrical metallic tubing (EMT) may be used in place of rigid conduit in dry locations subject to governing regulations, embedded in masonry walls, and concealed above suspended ceilings. Connectors shall be provided with factory installed insulated throats. For EMT use steel concrete tight set screw fittings as manufactured by T & B or equal. Die cast or pressure cast fittings are not acceptable. Within service rooms conduit may be surface-mounted. Subject to requirements for use of other conduit, EMT may be used:
 1. In partitions;
 2. In ceiling spaces;
 3. In service spaces.
 4. In masonry walls
 5. In all exposed installations where not subject to mechanical damage.
6. Use flexible metallic conduit for connections to chain suspended and recessed fixture drops, motors and similar equipment where necessary to prevent transmission of vibration. A code gauge green grounding conductor shall be provided for all such connections. Use "Sealtite" conduit with Hubbell Kellum Sealtite conduit strain relief grips for all connections at motors and noise generating equipment. Such use is restricted to:
 1. luminaires and device final drops to fixtures located in suspended lay-in-panel ceilings;
 2. Locations requiring vibration isolation;
 3. Flexible armoured conduits shall be limited to 10'-0" lengths where run horizontally from take-off junction boxes, and shall be minimum 600 mm at motors and noise generating equipment.
7. Fasten every conduit and cable to structure by means of accepted conduit clamps or clips. Wire lashing is not acceptable.
8. Conceal conduits and wiring except where noted. Run exposed conduits parallel to building

lines and to other conduits. Provide every empty conduit with a pull rope and identify to designate its function (Power, Telephone, Fire Alarm and the like).

9. Where conduit is installed in concrete slabs, obtain general acceptance, prior to commencing the work, on both maximum dimension and cross overs which may be used therein.
10. Install conduits in such a manner as to conserve head room and interfere as little as possible with free use of space through which they pass. Obtain acceptance for routing of same. Keep conduits at least 150 mm clear of high temperature work.
11. Conduit installed at the roof level of exposed structures, shall be run tight to roof deck, above purlins and beams.
12. Conduit and cables for electrical work in demountable type and drywall type partitions shall enter from above, from a junction box concealed in the ceiling above and shall comprise a flexible conduit connection.
13. All branch wiring shall be provided with a separate code gauge supplementary grounding conductor run in each conduit or duct, terminating at ground block at panelboards.
14. Run conduit exposed in mechanical equipment rooms and areas, electrical rooms and areas, fan rooms, and the like, and installed after mechanical and other equipment is completed. Install fixtures, outlets, starters, etc., to clear and to suit application.
15. Runs of communication and control wiring provided under this Contract shall be installed in zone conduit sized for present and future use, from communications and control demarcation points to each ceiling level, and each fire compartment, and as additionally described on Drawings.
16. Further, communications wherever required to cross exposed ceiling areas shall be located in conduit. In general, each Building System shall have its own system of conduit that shall be provided by the Trade Contractor installing such Building System. The exception to this is for empty conduits and boxes to partitions and otherwise as noted on electrical drawings and as required for communication and data device locations shown on drawings, which shall be provided by the Electrical Trade Contractor for the use of other Trade Contractors or the Owner. Further requirements are specified under each Building System.

Conduit Materials

1. As indicated in Electrical Specifications on Electrical Drawings.

Conduit Installation Particulars

1. Where conduit joints occur in concrete, use silicone sealing compound to make water tight.
2. Lay out conduit to drain free of all moisture.
3. Securely hold conduits in place in concrete or masonry during pouring and construction operations; provide templates, forms and spacers as necessary.
4. Support multiple runs of conduit on channel or angle iron with rod hangers.
5. Secure all conduits in place with conduit clamps, T & B or approved equal. Perforated pipe straps, wire lashings, wood screws or nails are not acceptable.
6. Provide conduit expansion joints where conduits cross building expansion joints, also in straight runs of conduit 30 m (100') or longer. Conduit expansion joints shall be telescoping sleeve type, with insulated bushings and ground jumper.
7. Make field bends and offsets uniform and symmetrical without flattening conduit. Minimum bending radius shall be ten (10) times the conduit diameter.

8. Ream conduit ends to remove burrs and sharp edges. Fit conduit stubs with waterproof plastic caps during installation to protect threads and to prevent entrance of moisture into conduit.
9. Test all conduits for clear bore using ball mandrel, brushes and snake. Clear any conduit which rejects the ball mandrel. Replace if necessary. Bear all costs involved in making all work good, restoring all surfaces to original condition.
10. Install a continuous nylon cord 180 kg (400 lb) test in each conduit left empty.
11. Install a copper ground conductor within the flexible conduit at each connection.
12. Provide conduit seals in conduits which pass to the outside.
13. Provide pull boxes, fittings or junction boxes in conduit runs, on the basis of not more than two (2) right angle bends or their equivalent or not more than 30 m (100'), in straight runs between boxes. For outdoor direct buried conduit, up to 50m.
14. Size conduits to code requirements, provide larger sizes where noted.
15. Size conduits for low voltage wiring to manufacturer's recommendations.
16. Provide conduit sealing fittings and correspond for hazardous application to Electrical Safety code requirements.
17. Maximum conduit size permitted in a concrete slab shall be 35 mm. In any case verify with Structural Consultant for acceptability.
18. Where multi-conduits parallel run and/or crossover in concrete slab/wall, verify with Structural Consultant for acceptability.

Surface Metal Raceway (acceptable only where conduit cannot be used)

1. Provide surface raceway only where other methods of routing cannot be accomplished, and only with permission of Consultant. The surface metal raceway systems shall consist of surface metal raceway, appropriate fittings and device brackets to complete installation.
2. Any surface raceway is to be utilized in dry interior locations only as per ESA.
3. Submit drawings for acceptance showing the complete layout of all products that make up the complete system for each floor prior to installation with raceway lengths, device type (power and data), locations and circuits identified, complete with data sheets and samples.
4. Any surface raceway system that is allowed because other methods are not possible, for branch circuit wiring and/or data network, voice, video and other low-voltage wiring, shall be Wiremold ALDS 4000 Series with base, cover, associated fittings and joints to suit conditions and device covers, or equivalent by Hubbell. The raceway shall be metal, two-piece design with a base and a snap-on cover. The raceway shall be complete with one integral barrier in the base for power/data separation. Power shall be in top; data in the bottom. Finish to all exposed fittings and raceway shall be anodized satin unless otherwise noted.
5. For individual devices located on surfaces where conduit cannot be recessed provide single or double channel raceway system products.
6. Receptacle / Data plates shall be Wiremold V4047 series, or accepted equivalent by Hubbell.
7. Exposed raceway in finished area (not in service spaces, mechanical/electrical room, ceiling, etc) shall be: Hubbell HBL500 series or Wiremold V700, white finish.
8. Install raceways system complete with appropriate fittings such as connectors, bushings, elbows, couplings, locknuts, expansion fittings, fasteners and supports and accessories supplied as integral parts of assembly, as specified. Installation shall comply with Regulatory Authorities

requirements.

9. Neatly install exposed raceway running parallel to and at right angles to building lines and equally spaced in groups.
10. Keep raceway ends parallel and on proper spacing to suit knockouts or raceway openings in equipment or enclosure.
11. Keep raceways at least 150 mm clear of heating pipes, flues and hot item surfaces. Where required clearance cannot be provided, obtain written approval from Consultant to alter layout or to reduce clearance.
12. Provide expansion couplings, with bonding jumper and ground clamps where raceways cross building control joints.
13. Use only metallic, enclosed raceway on installation that required shielding of electrical cables or where installed in ceiling used as return air plenum, as specified or indicated on Drawings.
14. Raceways shall have established positive low resistance paths to ground and effectively isolate conductors so that any short-circuit arc is confined.
15. Select appropriate fittings, such as grounding bushings, bonding and grounding straps, to maintain continuity and effectiveness of grounding of raceway system.
16. Provide necessary fasteners and supports acceptable for type and size of raceways, to ensure rigid, complete assembly.
17. Provide suitable inserts or expansion type machine bolts for fastening raceways, fittings, boxes and equipment to concrete surfaces.
18. Do not use wood screws, lag screws, expansion shields, rawl plugs and nylon inserts.
19. Secure raceway and other associate work to structure members. Raceway shall not be supported from ceiling suspension system.
20. Thoroughly clean raceway and dry clear obstructions before pulling cable or wire.
21. Minimum raceway size: 21mm (3/4").

Outlet and Conduit Boxes

1. Comply with the requirements of latest edition of the followings:
 1. CSA Standard C22.2 No.18, Outlet Boxes, Conduit Boxes and Fittings.
 2. CSA Standard C22.2 No. 85, Rigid PVC Boxes and Fittings.
2. Outlet and conduit boxes - general
 1. Size boxes in accordance with CSA C22.1.
 2. 102mm square or larger outlet boxes as required for special devices.
 3. Gang boxes where wiring devices are grouped.
 4. Blank cover plates for boxes without wiring devices.
 5. 347V outlet boxes for 347V switching devices.
 6. Combination ganged boxes with appropriate steel removable barriers where outlets for more than one system are grouped.
 7. Where standard make boxes are not suitable, provide boxes of special design to fit space and other requirements.
 8. Where vapour proof lighting is specified, provide matching vapour proof ceiling or wall junction boxes and fittings as required.
3. Sheet steel outlet boxes

1. Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38mm or as indicated. 102mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
 2. Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48mm.
 3. 102mm square or octagonal outlet boxes complete with steel fixture studs where supporting lighting fixtures. Die cast fittings not permitted.
 4. 102mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.
4. Masonry boxes
 1. Electro-galvanized stamped steel masonry single and multi gang boxes for devices flush mounted in exposed block walls, minimum size 95x 50 x 64mm standard and 102 x 57 x 61mm for 347V.
5. Concrete boxes
 1. Electro-galvanized stamped steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.
6. Floor boxes for receptacles and telecom outlets
 1. Single or double receptacles and /or telecom outlets: Round type, concrete tight electro-galvanized sheet steel floor boxes complete with side and bottom knock-outs, and with adjustable finishing rings to suit floor finish with brushed aluminum faceplate. Device mounting plate to accommodate short or long ear receptacles. Minimum depth: 28mm for receptacles; 76mm for communication equipment.
 2. Multi receptacles and /or telecom outlets for meeting rooms and open work rooms: Electro-galvanized stamped steel concrete type, combination power / communication, flush mounting complete with modular device plates, side and bottom knockouts, lift-up cast aluminium recessed cover and cable lid, grey epoxy powder finished. Box 356mm (L) x 321mm (W) x 105mm (D).
 3. Legrand RFB9 for casting into concrete and with cover RFB119CTCGY or approved equivalent. Provide all necessary accessories to suit application and carpet insert.
7. Conduit boxes
 1. Cast FS or FD aluminium, or ferrous alloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.
 2. PVC FS or FD boxes or PVC conduit where required in special corrosive areas as indicated on Drawing.
8. Fittings - general
 1. Bushing and connectors with nylon insulated throats.
 2. Knock-out fillers to prevent entry of debris.
 3. Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.
 4. Double locknuts and insulated bushings on sheet metal boxes.
9. Installation
 1. Support boxes independently of connecting conduits.
 2. Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
 3. For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come with 6 mm of opening.
 4. Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washer are not allowed.

5. Size and install appropriate boxes and enclosures in accordance with applicable section(s) of Ontario Electrical Safety Code and manufacturer's recommended procedures.
6. Co-ordinate location and installation of boxes so as to be accessible and clear from Building System equipment, etc.
7. Install pull boxes in inconspicuous but accessible locations.
8. Use pull boxes for conduits larger than 35mm. Use conduit outlet bodies for conduit 35mm.
9. Provide approved hole plugs in unused conduit knockouts and openings.
10. Furnish boxes and enclosures with corrosion resistant machine screws.
11. Boxes and enclosures embedded in concrete for flush mounting, shall be secured properly with connecting conduits and related works set in place before concrete is poured. Forms, when used, shall be able to be removed without disturbing installed boxes or enclosures.
12. Ensure junction and outlet boxes mounted in ceiling cavities do not interfere with removal of ceiling tiles.
13. Use masonry boxes for flush mounting in exposed block walls, concrete boxes for flush mounting in concrete wall.
14. Furnish conduit boxes with neoprene gaskets for outdoor area or hazardous area application.
15. Install all wall boxes for door security access devices, fire alarm devices, etc., adjacent to lock side of door openings unless otherwise shown. Check door swing before installing any switch.
16. Install all boxes in walls so that tapped holes for mounting wiring devices or fixtures will be aligned vertically or horizontally, as required. Where boxes are grouped at one location with common and varying mounting heights, align boxes horizontally and vertically from centre line unless otherwise indicated.
17. Offset outlet boxes in sound attenuating partitions to avoid undue transmission of sound between the partition elements. Use flexible conduit connections where wiring is required between outlet boxes on opposite sides of partition.
18. Offset outlet boxes where installed on either side of a fire separation.
19. Where steel supports are required for outlet boxes, wood supports are not acceptable.
20. Maintain integrity of vapour barriers along building perimeter wall where flush outlet boxes are required.

2.12. Wire and Cable

1. In general, electric power connections and power wiring for equipment in systems described in this and other Divisions shall be supplied and installed by the Electrical Trade Contractor unless specifically noted for installation by the Trade Contractor responsible for the system. See Starter Schedule on Drawings for clarification. The Contract requires complete electric wiring to ensure functional and operational systems. All electrical work must conform to requirements described in Electrical Divisions and be concealed except in service areas. Comply with the requirements of the latest editions of the following:
 1. CSA C22.2 No. 0.3, Test Methods for Electrical Wires and Cables.
 2. CAN/CSA-C22.2 No.131 – Type TECK 90 Cable.
 3. CSA C22.2 No. 38, Thermoset Insulated Wires and Cables.
 4. CSA C22.2 No. 75, Thermoplastic-Insulated Wires and Cables
 5. CSA C22.2 No. 65, Wire Connectors.
2. All wiring for powering of components of a Building System must be in solid conduit or EMT, excepting only where specifically noted for armoured.
 1. Use minimum solid #12 wiring and larger as required for deratings.
 2. #10 AWG wire and larger shall be stranded.
 3. Use RW90 X-Link, 1000V, minus 40 degree, 90°C rated insulation for 250MCM and larger.
 4. Joints in feeder cables are not permitted. Co-ordinate lengths with cable supplier.
 5. For wiring through or in lighting fixtures use type 'GTF' fixture wire, rated 600 volts to meet code requirements for recessed fixtures.
 6. Wires and cables for outdoor locations and feeding items outside of the plane of the

- building thermal barrier system shall be minus 40°C rated.
7. Single conductor armoured cables, where required, shall conform to the Electrical Safety Code, Rule 12-108, Bulletin 12-7-11.
 8. BX may be used only in hollow partitions for receptacles, but not more than 3 meters long.
 9. Lighting fixture wiring in accessible ceiling spaces shall be run in conduit from the lighting panel to ceiling outlet boxes with armoured cable drops no longer than 3.0m (10 ft.) permissible from the boxes to fixtures.
 10. Armoured cables, where specifically allowed, shall be complete with interlocked aluminum armour, approved fastening and connectors and meet the requirements of Vertical Flame Test-Cables in Cable Tray of CSA C22.2 No. 0.3. The PVC jacket cables (TECK 90 and ACWU90) shall be FT6 rated.
3. In general, electric control connections and wiring necessary to provide control of components of a Building System, to ensure its complete and integrated function, and to ensure it fulfils each and every requirement of the system sequences of operation and the functions of the component, shall be provided by the Trade Contractor responsible for such system. Conduit for such wiring shall be provided by the Electrical Trade Contractor for all devices of systems that are shown on electrical drawings, whether electrical or for other systems. All other conduit for controls wiring for devices not shown on electrical shall be provided by the trade contractor responsible for the system.
 4. All wiring for control of components of a Building System must be in solid conduit or EMT using minimum #18 wire for 24 volt control or less, and minimum #14 wire for 120 volt control and motor control. Use wiremold where wiring cannot be concealed in finished areas, after obtaining acceptance of Consultant in each case.
 5. Electrically operated equipment shall be C.S.A. accepted and bear acceptance label. Special Inspection Label acceptable to provincial authority having jurisdiction will be accepted in lieu of C.S.A. acceptance.
 6. Provide branch circuit wiring, conduits and feeders to form a complete Electrical Distribution System as required to power equipment and devices of that system, lighting, and auxiliary systems and related systems electrically-powered components. Separate conduit systems shall be provided for feeder, lighting and power systems and auxiliary communication systems.
 7. Wire and cable shall comprise copper conductors, sized as noted, rated 75 deg. C., 600 volt minimum flame retardant insulation, and CSA approved for application. Use of aluminum shall only be allowed for electrical service work from utility system to building electrical system only where specifically noted on drawings for aluminum.
 8. Wire and cable installed in conduit shall be PVC insulated Type TWH Flame retardant and comply with CSA Specification C22.2 No. 75.
 9. Use Electrovert "Z Type" code markers for control & communication conductors, regardless of what Trade Contractor provides the wiring.
 10. Minimum wire size for power wiring shall be No. 12 AWG gauge unless specifically noted otherwise for select applications of wiring, or where runs exceed 27 metres (90') which shall be minimum No. 10.
 11. All power wiring to equipment and devices shall be in conduit unless specifically noted otherwise for select applications of wiring. 'Bx' wiring may be used for final portions of runs from junction boxes for the power wiring of fixtures and devices that are suspended (other than suspended using steel conduit) or that are located in suspended assemblies or assemblies subject to movement.
 12. Wiring between sensors and controls units, regardless of what Trade Contractor provides the wiring, shall be Class II, 18-24 AWG, red insulation, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

13. Wiring for communications systems shall be strictly in accordance with the detailed specifications for each system, and to meet the written recommendations of the manufacturers of each system component.
14. Wire and cable shall not be installed at site condition temperatures below 20°C unless "-40" type is used. Wiring to heating equipment shall be rated 90°C minimum, the ampacity of which shall be limited to 75°C value. Wiring for exterior locations in the finished Work shall be type 'U', -40°C rated.
15. Conductors used for all auxiliary systems (e.g. Fire Alarm) shall be tagged and/or colour coded by Trade Contractor installing such wiring, and where applicable shall agree with manufacturer's wiring diagrams.
16. Maximum voltage drop between furthest outlet of any circuit, when fully energized, and panel to which it is connected shall not exceed two percent except for electric heating circuits that shall not exceed one percent. Determination shall be by Trade Contractor installing such circuit, to the approval of authorities and acceptance of the Consultant.
17. All circuits shall contain separate phase, neutral and ground conductors. Common neutral configuration shall not be permitted.
18. Cables shall be terminated with moisture proof connectors, clamped to sheet metal enclosure by a single non ferrous locknut and grounding bushing.
19. Sheaths of multi conductor cables shall be grounded at both cable ends.
20. Sheaths of single conductor cables shall be grounded at supply end only. Provide a Code Gauge Grounding Conductor with each feeder cable run.
21. Number of wires indicated for lighting and power, motor and motor control, alarm, signal, communications, and auxiliary systems is intended to show general scheme only. The required number and types of wires shall be installed in accordance with equipment manufacturer's diagrams and requirements, and with requirements of the installation, except that specification standards shall not be reduced.
22. Solderless connectors with nylon jacketed "Vibration proof" screw on wire connectors ideal "Wing Nuts", rated 600 volts shall be used for joints in Branch Wiring.
23. Use compression joints and terminals for all control wiring; and all conductors #4 AWG and larger. Mechanical connections are acceptable at panelboards and circuit breakers where these are part of factory assembly.
24. Wire or cables in feeders, sub feeders and branch circuits shall be colour coded in accordance with Ontario Electrical Safety Code. Each end of feeder terminations (e.g. in Switchboard, Panelboards, switches, splitters and the like) Code Phase A - Red, Phase B - Black, Phase C - Blue, Neutral - White.
25. Include in each conduit, tubing and raceway, a code gauge green supplementary grounding conductor which shall be connected to suitable ground bus in equipment.
26. Armoured or sheathed cables may be used only for vertical wiring within demountable and dry wall type partitions and above drywall ceilings as fixture whip between junction box and fixture only; however it shall not be directly buried in or below concrete slabs.
27. The use of exposed plastic jacketed cables shall be subject to Contract Change Order and approval of local inspection Authorities, but shall not be installed in ceiling spaces used as return air plenums for mechanical air handling systems. The Work shall only include such wiring for electrical distribution and power purposes upon review and acceptance of a

proposed substitution by the Owner, with credit to the Contract Price. Do not bid the Work with expectation of acceptance of any plastic-jacketed wiring except where specifically set out in the Documents.

28. For underground wiring use conductors with RWU type insulation.
29. Use an approved lubricant to assist in pulling conductors through conduit. Neatly train and lace wiring inside boxes, equipment and panelboards.
30. Balance the loading on feeders so that unbalanced load is less than 10%.
31. Protect all exposed non-armoured cables in manholes, pull pits and trenches with an approved fire protective fibreglass tape of '3M' manufacture or approved equal. Extend the protective wrapping on the cables where they leave pull pits or trenches below switchgear to the circuit breaker or fused switch terminals. Rack cables in manholes and pull pits to provide clear access for maintenance and servicing.

2.13. Devices

1. Wiring devices unless otherwise specified herein, or noted, shall be as manufactured by Pass & Seymour, with acceptable alternatives by Hubbell, or Leviton. All devices shall be of one manufacturer throughout.
2. The following are minimum standards. Additional specification requirements and selection of devices are described on drawings, in schedules, and in applicable specification sections for each Building System.
3. Provide each device with an outlet box of suitable dimensions and a faceplate. Device boxes shall be adapted to their respective locations.
4. Comply with the requirements of the latest editions of the following:
 1. CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Wiring Devices.
 2. CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices.
 3. CSA-C22.2 No.55, Special Use Switches.
 4. CSA-C22.2 No.111, General-Use Snap Switches.
 5. CSA-C22.2 No. 144, Ground Fault Circuit Interrupters.
5. All exposed devices and cover plates shall be white finish unless noted otherwise.
6. Switches, Occupancy & Daylighting Control Sensors, Receptacles and Other Similar Devices
 1. Refer to Electrical Specifications on Electrical Drawings.
7. Device Installation, Mounting Heights and Locations
 1. As Set out in Electrical Specifications on Drawings; and as described herein.
 2. Mounting heights are from finished floor level to centre line of device outlet, unless noted otherwise. Confirm all locations before installation. In all areas accessible to persons in wheelchairs, the mounting heights of all switches, thermostats, intercom switches, pull stations, etc. shall comply with OBC Code requirements.
 3. The mounting heights of all power and lighting devices shall comply with Ontario Electrical Safety Code requirements and Barrier Free requirements of the Ontario Building Code. The mounting heights of all fire alarm devices shall comply with CAN/ULC requirements.
 4. If mounting height of equipment is not specified or indicated, verify before proceeding.

5. Approximate locations of electrical equipment, fixtures switches, outlets, and the like are given on the drawings. In absence of definite detail exact location of outlets shall be determined on site as work progresses.
6. The right is reserved to alter the location of devices a distance of up to 10' (3 metres) without involving a change to the Contract amount, providing notice is given prior to installation.
7. Switch and receptacle boxes and similar penetrating elements of assemblies shall not be installed "Back to Back". Separate by a minimum of 6" (150 mm), except in stud supported assemblies separate by a minimum of one stud space, to minimize sound transmission.
8. Dimmers and other devices requiring or subject to heat loss shall be mounted in individual boxes. Do not gang such devices.
9. Local switches for lighting shall be installed on the lock side of doors.
10. Device plates shall cover opening left for outlet box, and plates shall be attached to boxes in an accepted manner. Outlets and fixtures are to be located symmetrically, (i.e. centred in wall panels, ceiling panels or tiles, columns, between and above doors and the like).
11. Install single throw switches with handle in "UP" position when switch closed.
12. Install devices in gang type outlet box when more than one switch is required in one location. When supplied from different voltages or power sources, provide metal barriers in the box.
13. Clean debris from outlet boxes.
14. Install devices plumb and level.
15. Adjust devices and wall plates to be flush and level.
16. Clean exposed surfaces to remove splatters and restore finish.
17. Test each device for proper polarity and proper operation.

2.14. System Component Identification

1. Identify electrical equipment described in the Electrical Divisions with 3 mm thick black laminated plastic nameplate to indicate equipment controlled to provide instruction or warning. Fasten each plate with two chrome-plated screws. Lettering shall be 6 mm high for small devices such as control stations and at least 13 mm high for all other equipment.
2. Provide panelboards with typewritten schedules identifying outlets and equipment controlled by each branch circuit including existing panels being changed. Protect schedules with non-flammable clear plastic.
3. Identify junction boxes, pull boxes, cover plates, conduits and the like, provided for future extension, indicating their function (e.g. power, fire alarm, communication).
4. Verify Owner's room names and numbers prior to listing on nameplates and schedules.
5. Identify conduits and cables for the various systems by the use of the following distinctive coloured labels. The Labels shall comprise pressure sensitive plastic tape with printing labels indicating the system. Apply a small area of paint to the outside and inside of each outlet box, pull box and panel as it is being installed. Identify junction boxes in suspended ceiling areas with colour on both inside and outside.
 1. 120/208 volt system – yellow

2. Fire alarm systems – red
 3. Data cabling system – blue
 4. Security/Intercom/CCTV systems – black
 5. Other telecommunication systems – green
6. Locate identification labels at follows:
1. Behind each access.
 2. At each change of direction, at junction boxes, and at both ends of each run.
 3. At not more than 15m apart in straight runs.
 4. Where passing through a wall, partition & floor. 1 on each side of wall, partition, & floor.
7. In addition, each box shall be identified with a system and service designator of logic reference to the service.

2.15. Cable and Conduit Labels

1. For power and lighting system feeders, install labels at either end of the conductors where terminated inside of equipment to match wiring diagram conductor identification or panelboard circuit numbers. Typical identification Panel AA circuit - 21; use "AA-21". For a three phase circuit provide identification on phase A conductor only. For a single phase circuit provide identification on the phase conductor.
2. For lighting branch circuits identify circuit at panel and in outlet box connection to lighting fixture. Install label on phase conductor tap-off. Typical identification if fixture connected to Panel A, circuit 5; marker identification A-5.
3. For branch circuits supplying single phase and three phase devices such as receptacles and connections to equipment identify conductors at panel and in device outlet box. Install label on phase conductor inside outlet box. Typical identification if device is connected to Panel B - circuit 14, marker identification "B-14".
4. For switchboards identify all control conductors at terminal strips inside equipment and where terminated at all remote devices. Identification shall match numbering system on Drawings and "Reviewed" shop drawings.
5. Identify all fire alarm systems conductors at terminal strips located in:
 1. Control panels.
 2. Annunciators.
 3. Printers.
 4. Local terminal cabinets.
 5. All remote devices.
 6. All connections in the system.
 7. Identify in accordance with the numbering system on the accepted shop drawings.
6. For miscellaneous systems identify all conductors at terminal strips located in:
 1. Control and/or monitoring panels.
 2. Control and/or monitoring stations.
 3. Local terminal cabinets.
 4. All remote devices.
 5. All connections in the system.
 6. Identify in accordance with the numbering system on the accepted shop drawings.
7. Equipment Nameplates
 1. Provide lamaroid name plates, black background with white engraved letters 0.4" (10 mm) high, for electrical equipment but not limited to panels, switchboards, transformers, disconnect switches, breakers, contactors, relay panels, starters, TVSS, UPS, FACP and

- miscellaneous panels.
 - 2. Nameplates shall indicate voltage, capacity, upstream, and downstream equipment Typical identification for panel: "Lighting Panel C, 120/208v, 3p, 4w. Supplied from Panel BB".
 - 3. Install plates after all painting has been completed. Secure with mechanical fastening devices except on the inside of panel doors where gluing will be acceptable.
9. Power system colour code
- 1. Power system phase colour code:
 - 1. Red - Phase A
 - 2. Black - Phase B
 - 3. Neutral - White
 - 4. Ground - Green.
 - 2. Identify incoming utility service lines with enamel paint to above colour code.
 - 3. Band buses in switchboard and panels to above colour code.
 - 4. Provide branch conductors to above colour code.
10. Manufacturer's Nameplates
- 1. Have the manufacturer's nameplates affixed to each item of all equipment showing the size, name of equipment, serial number and all information usually provided, including voltage, cycle, phase, horsepower, etc., and the name of the manufacturer and his address. Ensure that all stamped, etched or engraved lettering on plates is perfectly legible. Ensure that nameplates are not painted over. Where apparatus is to be concealed, attach the nameplate in an approved location on the equipment support or frame.
 - 2. Ensure that panels and other apparatus which have exposed faces in finished areas do not have any visible trade marks or other identifying symbols. Mount nameplates behind doors.
11. Signage: Provide signage to local inspection authority on all equipment and electrical rooms. The suitable warning signs must be installed as per Electrical Safety Code.

2.16. Junction Boxes, Pull Boxes and Cabinets Accessories

- 1. "Thruwall" and "Utility" type boxes shall not be used.
- 2. Electrical boxes and panels shall be CSA approved, code gauge sheet metal, galvanized or with suitable protective treatment. Secure covers with screws or bolts.
- 3. Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position. Covers with 1" (25mm) minimum extension all around, for flush-mounted pull and junction boxes.
- 4. Sheet steel cabinet, with hinged door and return flange overlapping sides, handle, [lock] and catch, for surface mounting.
- 5. Electrical Trade Contractor shall provide a fuse storage cabinet, manufactured from 3mm thick aluminium 750mm high, 600mm wide, 300mm deep, hinged lockable front access door finished.
- 6. In general, junction boxes, pull boxes, and cabinets shall be separate for each Building System. Each Trade Contractor responsible for the Building System shall provide a separate distribution system, with the exception of the data and communication system for the Owner's data, telephone, and communication use. For this only, systems may share the conduit and related accessories subject to restrictions of applicable codes and regulations. Wiring to control Building Systems shall not be installed in conduit and accessories assigned to the Owner's data and

communications systems.

7. Size accessories to distribution systems for future use and in accordance with codes and regulations for full capacity of conduits for number of conductors, deratings, and connections.
8. Use suitable electrical boxes for terminations and junctions on conduit work. Install pull boxes where necessary to permit installation of conductors. Support pull boxes, outlet boxes, panels and other cabinets independently of conduit
9. Install surface mounted devices, in cast conduit fittings, with threaded hubs and suitable stainless steel faceplates.
10. Mount Cabinets with spare parts and fuses to not higher than 6'-6" (2,000mm) above finished floor. Comply with latest code requirements.

2.17. Equipment

1. Provide power connection to all equipment scheduled on drawings or noted in specifications as "Owner-supplied", regardless of Division. This includes all hard-wired equipment, process equipment, and includes adapting outlets and devices to meet requirements of Owner's equipment plugs and fittings. "Owner-supplied" means supplied by Owner to this Contract from a source outside this Contract. All equipment required in the Contract is by definition NOT Owner-supplied.
2. Approximate locations of electrical equipment, fixtures switches, outlets, and the like, are given on the drawings. Refer to architectural drawings and room elevations for application. In absence of detailed exact location of outlets shall be determined on site as work progresses.
3. Confirm capacity, ratings and characteristics of equipment and items supplied by other Trade Contractors that are being powered by the Electrical Trade Contractor. Resolve discrepancies before beginning power installations.
4. Unless specifically noted on mechanical or electrical drawings and schedules, all motor starters for equipment will be supplied by the Trade Contractor that supplies the equipment, for installation and connection by the Electrical Trade Contractor under the work described in the Electrical Divisions.
5. Co ordinate the exact location and verify characteristics of electrical provisions for work described by Mechanical during the bidding period, and confirm upon Contract start.
6. The locations of starters, motors and associated equipment shall be coordinated with other Trade Contractors. Co ordinate with the work of such Trade Contractors to ensure proper location of equipment. The exact locations of conduit terminations at electrically-powered units shall be determined from equipment manufactures' shop drawings as approved by the Trade Contractor responsible for the system and accepted by the Consultant. Conduits must be installed to enter only in the locations designated by equipment manufacturers.
7. The right is reserved by the Owner and Consultant to alter the location of equipment and outlets a distance of up to 10' (3.0 metres) without involving a change to the Contract amount, providing notice is given prior to installation.
8. Provide power wiring and connection to equipment where noted, regardless of supply by any Trade. Provide all necessary wiring and connections that are "in line" in 120V and larger power wiring portions of the Electrical Distribution System, including wiring and installation of starters, interrupting thermostats, aquastats, speed controllers and time switches controlling equipment by interrupting the power feed to the equipment or device. Where systems and equipment have a power feed connection to a system control panel that incorporates line voltage power, and components of the system (including motors and equipment of whatever voltage) are then fed from that control panel, then the Trade Contractor responsible for that system shall provide the wiring and connection of such subsequent equipment and devices that

are "down line" from the control panel unless specifically noted otherwise on mechanical or electrical drawings. The Trade Contractor, upon award of Contract, may elect to contract with the Electrical Trade Contractor for such work, but shall bid the work as set out herein.

9. Wire and connect weatherproof unfused safety disconnect switches except as specifically noted above, fastened to exterior of roof mounted units, to acceptance. Electrical Trade Contractor shall supply such devices unless drawings and schedules for such units specifically note that such disconnects are factory-installed or manufacturer supplied. Where unit has been supplied without such protection, even though scheduled on drawings or noted in the specification, supply disconnects at the relevant Trade Contractor's cost and at no cost to the Owner.
10. At time of bidding and at award of Contract, inspect Equipment Schedules and specifications of this and other Divisions for further detail. Incorporate all electrical work reasonably inferable from such inspection. The Electrical Trade Contractor is specifically cautioned that connections and powering of equipment and devices is not limited to the electrical and mechanical divisions, but includes other divisions of the specification and work.
11. Where motor starters, switches and similar items are grouped together, a suitable 19 mm (3/4") thick plywood panelboard shall be provided to which all such items shall be secured. Provide all necessary angle iron supports for support of panelboard and paint entire assembly with two coats of fire retardant type enamel approved by authorities and accepted by the Consultant.
12. Sprinkler proof equipment is required this Contract.
13. Where equipment may be subject to damage from users with hoses, washdowns, adjacent exposed mechanical systems under pressure, or non-pressurized mechanical systems overhead, all such equipment shall be supplied as follows:
 1. Louvres facing outward and downward where openings are required for heat dissipation. Expanded metal screening is not acceptable.
 2. CSA-certified sealing rings for rigid steel galvanized conduit and CSA-certified raintight connectors for steel galvanized electrical metallic tubing (EMT) or other raceways.
 3. Provide seal rings and raintight connectors on all conduit terminations entering the top or side of all enclosures and for all conduit terminations for pull boxes, junction boxes, splitter troughs, wireways, auxiliary gutters, cable troughs and disconnect switches installed below the level of the sprinkler heads.

2.18. Grounding

1. Ground and bond all electrical systems to provisions of the Ontario Electrical Safety Code.
2. Provide grounding electrodes to Section 10 of the Ontario Electrical Safety Code.
3. Install grounding conductors to permit the shortest and most direct path from equipment to ground. Install grounding conductors in rigid galvanized conduit with both conductor and conduit bonded at both ends. Provide bonding jumpers with accepted clamps to maintain ground continuity of metallic raceway systems at all expansion joints.
4. Ground connections to grounding conductors shall be accessible for inspection and made with accepted solderless connectors bolted to the equipment of structure to be grounded. Clean contact surface prior to making connections to ensure proper metal to metal contact. Connections shall be of the type that grounds both conduit and conductor, and cap screws, bolts, nuts and washers shall be silicon bronze.

2.19. Backboards

1. Provide backboards where indicated.

2. Backboards shall be minimum 3/4" (19mm) thick, good one (1) side fire retardant plywood backboards, pressure impregnated with fire retardant chemicals, and stamp, to CSA 080.
3. Construct each backboard in a rectangular shape of the size as indicated. Where no size is indicated, provide a backboard a minimum 4" (100mm) higher than the equipment. Where more than one (1) piece of equipment is installed on the backboard, construct the backboard of a size to suit the maximum vertical and horizontal dimensions of the equipment.
4. Finish each backboard with one (1) coat of primer followed by a minimum of one (1) finish fire retardant coat of ASA 61 grey paint prior to installing any equipment.
5. Set all backboards out from face of wall using 2x4 nominal studs at 16" (400mm) on centre to form a 3.5" (90mm) wire chase behind the backboard. Provide 4" (100mm) diameter holes throughout the backboard to facilitate cabling management and smooth all edges of holes. Co-ordinate locations of holes with Owner and communications trades.
6. Fastenings:
 1. Fasten each backboard to a wall or to a support structure using cadmium plated hardware. Provide a flat washer under the head of each fastener. Recess the head of the mounting bolt where equipment, including future equipment, is to be installed.
 2. Use expansion shields, toggle bolts or other types of wall fastenings to suit the wall type. Align the mounting bolts with the wall studs for stud type walls.
 3. Install fastenings a max. 20" (500mm) apart in both the vertical and horizontal directions.
 4. When installing equipment heavier than 50kg, fasten the equipment through the backboard directly to the wall or support structure.

2.20. Sequences of Operations and Building System Requirements

1. Complete controls for each Building System shall be provided by the Trade Contractor responsible for the Building System in order to achieve a complete and operating system, working in conjunction with the electrical trade contractor. Notwithstanding any responsibility of the electrical trade contractor for supply and/or installation of control related wiring or devices, all such work shall be carried out under the supervision of the individual responsible for the Building System as set out in Division 1. See Building System Requirements for co-ordination.
2. Under no circumstance shall a Building System or alteration to a Building System be provided in this Contract without the means to operate to achieve design intent and all sequences of operation that it must perform in expected service condition. All such work to achieve this performance, including components and installation, is required by this Contract.
3. All Trade Contractors and the Contractor are specifically cautioned that Building Systems must be provided with all controls, wiring, and components necessary for their operation, exclusive of any automated building energy monitoring or energy management control system. The function of such monitoring systems is to monitor and provide additional control that improves the energy performance of the Building System. Such systems do not replace the control of a Building System's components in relation to each other.

END OF SECTION

1. GENERAL

1.1. General Requirements

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Comply with requirements of Section 260500 – Electrical General Work Requirements, which form part of this Section as if repeated here.
3. Comply with requirements of Section 260501 – Basic Materials and Methods, which form part of this Section as if repeated here.
4. In addition to the above, particular contract requirements for the Communication Systems (telephone, data, audio/video systems and similar systems) are described in this Section. Contract requirements related to this system may be described in other Sections of the specification and/or on drawings and in schedules, as follows:
 1. Requirements for conduit, junction boxes, j-hooks, and raceway components of these systems, for devices and wiring components of these systems, as supplied and installed by the Electrical Trade Contractor in accordance with the general provisions of Division 26 and to support the Communication Systems,
 2. Requirements for related systems, and components of related systems, that provide inputs and outputs to this system, such as existing Facility and site communication, Facility and site data cabling, building tenant communication systems, wi-fi (wireless and phone lines), Rogers and/or Bell lines, and the Electrical Distribution System.
 3. Requirements for exterior and interior mounted junction boxes to accommodate the devices of this system, in accordance with the general provision of Division 26.
 4. Requirements for systems that are indirectly affected by this system.
5. All rough-in conduit, j-hook, junction box and raceway work for the Communication Systems shall be provided by the Electrical Trade Contractor as part of this Contract. This work includes but is not limited to the provision of penetrations, sleeves, fire-stopping, conduit, junction boxes and device boxes.
6. Unless otherwise described herein, wiring work and devices for the Communications Systems shall be provided by the Owner's forces outside of this Contract.
7. All existing components of the systems which are located in the renovated area but which serve areas beyond the renovated area shall be protected and maintained throughout the period of the construction work of this Contract. Do not proceed with any select demolition in uncertainty. Locate and confirm all wiring and components which are existing to remain. Drawings do not necessarily show these components. Include all costs for this work.

1.2. Related Requirements

1. The Contractor and the Electrical Trade Contractor are specifically cautioned that Work requires achievement of the performance objectives for this building system described in Section 019010, Section 260500, Section 260501 and this Section. The Contractor and Electrical Trade Contractor shall organize and shall provide all construction and related services reasonably inferable as necessary to achieve the performance objectives and intent of the design.
2. The Contractor and the Electrical Trade Contractor shall inspect all specifications and drawings, to ensure that the contract requirement for provision of complete and functioning Communication Systems throughout the Work are achieved.
3. The Contractor and the Electrical Trade Contractor shall:
 1. provide construction to supply Products and materials in accordance with Section 016010

- and execute the installation work in accordance with Section 017010 to meet the performance requirements for anticipated service life of the systems;
- 2. provide the design of connections and fasteners as set out in Section 017010; and
- 3. provide related services as set out in the general provisions of the Contract.

1.3. Systems Intent

1. The intent of the Communication Systems is to provide all rough-in for all telephone, data, public address, video, and communications network connections, from central demarcation points and equipment backboards within the fit-up areas to demarcation points within rooms and spaces where communication devices can connect and access the system.
2. The routing of the raceway and wiring components of this building system shall be subject to the precedence of all other building systems, where interference with proposed routing is encountered in the Work or in relation to existing conditions. Accommodate components of other building systems in laying out new portions of this system.
3. The location of components of this system shall be confirmed in relation to all other building systems so that they perform in their role as components of the Communication Systems. Other system components shall be installed to ensure a clear relation between devices of this system and the spaces and occupant tasks they serve. Where interference cannot be avoided by relocation of the device, provide a further device. Where such interference is brought to the Consultant's attention prior to installation of the interfering component and the device, the Consultant will instruct regarding relocations or request an additional device at Owner's expense. Where such interference is not brought to the Consultant's attention prior to installation of the interfering component, the Contractor shall provide relocation and/or additional device at no expense to the Owner.
4. The intent of the layout and rough-in of raceways and wiring for Communications System that systems maintenance can occur primarily within ceilings of corridors or shared spaces, so as to minimize maintenance and/or cabling interruptions within individual rooms or workspaces.

1.4. Work to Existing Building

1. Inspect & conform to the requirements for existing conditions, this project & existing building.

1.5. Pre-Installation Conferences

1. Schedule during initial phases of project start-up a meeting with the Consultant, the Owner, the Electrical Consultant and the Owner's Communications Equipment providers, to review and consider the means and methods proposed by the Contractor for installation of the systems, and to ensure that the location, intent, and requirements of the systems are clearly understood by the Contractor and the Electrical Trade Contractors who will perform the work of this system.

1.6. Sequencing

1. Plan and sequence work to permit installation of materials in conjunction with related materials so that the performance intent of the systems is achieved. Trades shall strictly conform to sequencing requirements for Environmental Separation Systems. Such requirements shall have primary precedence over all other construction sequences.

1.7. Submittals

1. Submit in accordance with Division 01 requirements, and:
 1. Product data sheets for all Products used in Communications Systems.
 2. Evidence of qualification of installation personnel for performance of the work of this Section, upon request by the Consultant.
 3. Service Room Layouts, in both plan and elevation, for all service rooms (including but not limited to Electrical Rooms, IT rooms, etc.), and showing all backboards, external

connections for power, and all other device box locations required for Communications Systems. Show all Communications Systems requirements in relation to all other system components within such spaces.

4. Detailed Schedule for labelling of all conduit and raceways.

1.8. Coordination

1. The Electrical Trade Contractor shall co-ordinate the layout and installation of conduit for the Communication Systems with other building systems and existing conditions.
2. Inspection work and co-ordination work required to achieve the requirements of this Section are the responsibility of the Electrical Trade Contractor and shall not be assigned to any other trade contractor even if portions of the material installation work are so assigned.
3. Coordinate the interior components of Communications systems provided this Contract with exterior conduit in the site and penetration through the environmental separation system, which are being provided by the Building Landlord, to ensure continuous pathways for the fibre-optic cabling routing from the Utility Pole along Queen Street to the communications backboard located in the Fit-Up Electrical Room.

1.9. Reference Standards

1. Conform to requirements for reference standards and codes set out in Section 260500, in the Electrical Specifications on Electrical Drawings, and Division 1.

1.10. Quality Control

1. The provision of Communication Systems shall be performed by experienced datacom cabling installation forces, working under the direction of the Electrical Trade Contractor, and having a minimum of three (3) years experience in similar cabling installations.

1.11. Basic Product and Execution Requirements

1. The work described in this Section shall be performed to meet the standards and requirements for supply and installation of products and materials, and related services, set out in Division 1, Section 260500, and Section 260501.

1.12. Commissioning

1. Perform commissioning requirements in accordance with Division 01 requirements to ensure the proper function of components of the system, and the system.
2. Perform point-by point verification of ALL wiring installed in Communications Systems, to confirm function, prior to handover to Owner. Where wiring fails, no matter the cause, remove and replace such wiring at no Cost to Owner.

1.13. Closeout Documents

1. Submit in accordance with Division 1 requirements: and
 1. Verification of performance of all cabling, to include 100% of cabling and all connections.

1.14. Warranties

1. Warrant in accordance with Division 1 requirements.

1.15. Building Systems

1. The work described by this Section is related to the following Building Systems as defined in

Section 019010 and discussed elsewhere in this Section. Comply with requirements for performance, review, and co-ordination of such relations as set out in that Section:

1. The Barrier Free Path of Travel Systems;
2. Environmental Separation Systems (and its sub-systems);
3. Interior Finishes System;
4. Grounding and Bonding Systems

2. PRODUCTS

2.1. Devices

1. Devices for Communication systems shall be supplied and installed by the Owner's Communications Contractor following occupancy of the renovated facility.

2.2. Raceways and Conduit

1. Raceways & Conduit shall be supplied and installed as part of this Contract. Provide raceways & conduit in accordance with Section 260501, the Electrical Specifications on Electrical Drawings, to all locations indicated on drawings and in schedules, and as further described herein:
 1. All Communication Systems within vertical partitions and exterior walls shall be in dedicated conduits complete with pull string:
 1. Within slabs to above slab and further to connect junction box to nearest accessible (lay-in) ceiling space, conduit shall be EMT or rigid conduit.
 2. Outside of the building conduit shall be plastic Sceptre or equivalent.
 3. Within partitions, from device boxes up to above accessible ceilings, to an open end located within the nearest accessible ceiling space. Conduit shall be EMT or rigid conduit. In areas of inaccessible ceilings, extend conduit from above such ceilings to nearest adjacent accessible ceilings (lay-in ceiling).
 4. Provide zone conduit for all crossings of inaccessible board ceilings.
 5. Provide J-hooks to cabling paths in all accessible ceilings to path layout shown on drawings.
 2. Provide device boxes for all communications systems devices locations shown on drawings.
 3. Junction boxes in accessible ceiling spaces shall be located in corridor areas. Do not locate in individual offices or meeting rooms, or in areas of work furniture. All access by Owner's maintenance personnel shall be from ladders placed in areas that will not interfere with furnishings layout.
 4. Feed device locations from above in all areas receiving dropped ceilings. Under-slab feeds shall be used only in areas with open ceilings and exposed deck.
 5. Devices located in exposed ceilings and deck shall have dedicated conduit installed to nearest accessible dropped ceiling, laid out and installed to locations agreed with the Consultant prior to installation.
2. Under no circumstances shall wiring be permitted to run horizontally within partitions, within service shafts, or to penetrate service shafts not in conduit. All conduit and wiring shall proceed from box location straight vertically into ceiling space above, or straight down into slab.
3. All cabling where scheduled or noted for installation by this Contract shall be shielded, to Cat 6 minimum and as further required for the devices and systems. Audio public address device cabling shall be purpose-made plenum rated cabling. Cabling for video capable devices must be fully compatible with the design and video communication signals.

4. Cabling shall be located and installed so as to eliminate interference from other electrically operated systems.
5. All cabling shall be terminated with connectors, permanently identified, and 100% tested for performance prior to handover to Owner for Owner's use in datacom systems.

2.3. Hangers and Support

1. Products and materials for hangers and support shall be as described in Section 260500 Basic Materials and Methods and the Electrical Specifications on Drawings.
2. All hangers and supports, except supports for equipment, shall be provided by the Electrical Trade Contractor as part of the base contract electrical work.
3. Cabling in accessible lay-in ceilings shall be installed to J-hooks provided by the Electrical Trade Contractor to layout shown on Electrical Drawings.

2.4. Equipment

1. All equipment for Communication Systems shall be provided by the Owner's forces following handover of the completed facility by the Contractor to the Owner.

2.5. Accessories and Appurtenances

1. All accessories and appurtenances for Communication Systems shall be provided by the Owner's forces following handover of the completed facility to the Owner.

2.6. External Connections

1. Communications Systems are connected to other Building Systems, including but not limited to:
 1. The Barrier Free Path of Travel Systems, by device boxes for height of installation;
 2. Environmental Separation Systems, by penetration of the barriers of this system by conduit, boxes, and other items in the systems;
 3. Interior Finishes System, for quality of appearance in the Work;
 4. Grounding and Bonding Systems, for proper and effective grounding of communications backboards.
 5. The Building Structural System for supports to u/s deck, as well as for coordination of feeds to floor boxes prior to pouring of concrete slabs-on-grade.

3. EXECUTION

3.1. Preparation and Protection of Existing Conditions, Select Demolition

1. Prior to installation, on site, lay out ALL exposed conduit and device locations for Consultant's acceptance. Provide concealed conduit wherever practically possible. Revise conduit and device locations as directed by Consultant.
2. Perform all work to systems in a manner that minimizes downtime for existing systems, regardless of number of mobilizations. Pay all costs for multiple mobilizations.
3. All existing components of the systems which are located in the renovated area but which serve areas beyond the renovated area shall be protected and maintained throughout the period of the construction work of this Contract. Do not proceed with any select demolition in uncertainty. Locate and confirm all wiring and components which are existing to remain. Drawings do not necessarily show these components. Include all costs for this work.
4. Provide all select demolition work to portions of Communication Systems that are to be removed and abandoned within the renovated space.

3.2. General Installation

1. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.
2. Location of equipment, devices and conduit shall be neat, in consistent relation to the building structural system rhythm and the requirements of architectural layouts.
3. Verify fully all components of systems as required to ensure proper operation of all new devices, equipment and new system capacity.
4. Comply with the Ontario Building Code and applicable electrical standards and code, except that where such Code references regulations and standards this Contract requires installation to the latest issued amendments and supplements of such regulations and standards. Conform to the most stringent requirement in each case.
5. Comply strictly with the Owner's practices and standards for the systems, except that in case of more stringent provision in this Contract the more stringent requirement shall govern.
6. Provide conduit for all systems. No datacom or telecom wiring shall run outside of conduit except within open ceiling spaces. All device locations shown on drawings for installation in walls and partitions shall be run in conduit to the nearest accessible ceiling space.
7. Install junction boxes to speakers to locations indicated for speaker rough-in on electrical drawings.
8. Do not install junction boxes for communications systems devices back to back or within same stud space where partitions are identified as acoustic (a) partitions. Where devices are shown back to back adjust position to suit, to direction of Consultant and Owner.
9. Install conduit from devices within rooms up to the accessible ceilings within the same room in which the device(s) is located. Do not extend conduit to accessible ceilings of adjacent rooms, to maintain continuity of acoustic separations.
10. Install labels all communications systems conduit in accordance with Section 260501.
11. Install pull string to all empty conduit.

END OF SECTION

1. GENERAL

1.1. Owner's Nominated Trade Contractor for the Work of this Section

1. All provision of wiring, devices, equipment and related appurtenances to the Electronic Safety and Security Systems shall be performed by the Owner's nominated Trade Contractor, bidding to and working under the Electrical Trade Contractor for the Work.
2. The systems are existing, and the Trade Contractor, Electrical Trade Contractor, and Contractor shall include all work required to existing the Facility's systems to meet the performance requirements and contract requirements for this Project. This includes all programming, new equipment, any required patch panels or control panels. The Work includes updates to programming and head end graphics and any user cards and new cards or fobs required by the Owner.
3. Submission of a bid for the Work shall be deemed as evidence that the Contractor, the Electrical Trade Contractor, and the Electronic Safety and Security Systems Trade Contractor have fully investigated and examined the existing systems at Waterloo City Hall, and have incorporated all work required to renovate the existing systems to suit this Project.
4. Communication between devices of these systems within the area of the Project to the central control equipment located in the existing Security Room and elsewhere shall be by means of:

controller panel provided by the work of this section and located in the existing Security Room adjacent to the renovated area

This Trade Contractor shall then supply all equipment and devices, and all connections, to and from the existing equipment and panels for each system, to form a fully functioning and complete system for Security or Door Access Control as the case may be.

1.2. General Instructions

1. Comply with Division 1, General Requirements, and the Conditions of the Contract, which form part of this Section as if repeated here.
2. Comply with requirements of Section 260300 – Electrical General Work Requirements, which form part of this Section as if repeated here.
3. Comply with requirements of Section 260305 – Basic Materials and Methods, which form part of this Section as if repeated here.
4. In addition to the above, particular contract requirements for the Electronic Safety & Security Systems are described in this Section. Contract requirements related to this system may be described in other Sections of the specification and/or on drawings and in schedules, as follows:
 1. Requirements for conduit, cable tray, and raceway components of this system, as supplied and installed by the Electrical Trade Contractor in accordance with the general provisions of Division 26 and to support the Electronic Safety & Security Systems,
 2. Requirements for related systems, and components of related systems, that provide inputs and outputs to this system, such as site telecom, security camera devices and recording systems, card reader access, alarm and intrusion detection devices. Note that automatic door operators, automatic entry systems, electro-magnetic locks to doorways, and similar components are NOT components of the Access Control systems, but are related systems that may have interconnection to this System.
 3. Requirements for interior mounted junction boxes to accommodate the devices. Where devices and wiring are provided under Cash Allowance or by Owner's forces, such as monitoring devices, cameras, data points, sensors, camera mounts, card reader devices and

similar devices, the requirements for roughing in, conduit and boxes shall be provided in this Contract but not as part of the Cash Allowances. Pay all costs for this work.

4. Requirements for systems that are indirectly affected by this system.
5. Access Control, Intrusion Detection, and specialist trade contractors performing work of this Contract as Owner's nominated forces shall inspect the General Conditions of the Contract and the requirements of Division 1. No previous agreement with the Owner, nor trade contractor policy or standard agreement, nor anything whatsoever shall mean that the trade contractor performing work under the Contract or for payment by Cash Allowance is released from any provision of the Contract unless specifically identified in Supplementary Instructions and agreed by Owner, Contractor, and Trade Contractor in writing. Owner-nominated trade contractors shall provide all items requested and required by the Contractor to provide completed submissions in response to requests and Submittals required by the Contract, in conformance with the Documents.
6. In general, all rough-in work for the Electronic Safety & Security Systems shall be provided by the Electrical Trade Contractor and not the Electronic Safety & Security Systems Trade Contractors. This work includes but is not limited to the provision of cable trays, j-hook pathways, penetrations, sleeves, firestopping, conduit, junction boxes and device boxes and cover plates to all locations indicated on drawings and as necessary for the systems and devices. This work is included in the Contract Price and means for accomplishment of the Contract Time and Construction Schedule, and is not included in the Work covered by any Cash Allowance.
7. The wiring, equipment, and devices of the Electronic Safety & Security Systems shall be provided by the Owner's nominated Electronic Safety & Security Trade Contractors, in conformance with the requirements of the Contract Documents in their entirety.

1.3. Related Requirements

1. The Contractor, the Electrical Trade Contractor, and Electronic Safety & Security Trade Contractor are specifically cautioned that Work requires achievement of the performance objectives for this building system described in Section 019010, Section 260300, Section 260305 and this Section. The Contractor, Electrical Trade Contractor, and specialist trade contractors performing work shall organize and shall provide all construction and related services reasonably inferable as necessary to achieve the performance objectives and intent of the design.
2. The Contractor, the Electrical Trade Contractor, and Electronic Safety & Security Systems Trade Contractor shall inspect all Sections of the specifications and all drawings, to ensure that the contract requirement for provision of complete and functioning Electronic Safety & Security Systems throughout the Work to locations where such systems are identified on drawings or in the specification are achieved.
3. The Contractor, the Electrical Trade Contractor, and Electronic Safety & Security Systems Trade Contractor shall:
 1. provide construction to supply Products and materials in accordance with Section 016010 and execute the installation work in accordance with Section 017010 to meet the performance requirements for anticipated service life of the systems;
 2. provide the design of connections and fasteners as set out in Section 017010; and
 3. provide related services as set out in the general provisions of the Contract.
4. The Electronic Safety & Security Systems Trade Contract bidders for work under Cash Allowances or by incorporation through a change to the Contract shall be nominated by the Owner. Only such Trade Contractors may bid on the work of these systems.
5. Where work of installing wiring and devices and systems to the Place of the Work is performed by Owner's nominated firm as a Subcontractor to this Contract, the trade firm shall cooperate fully with the Electrical Trade Contractor performing such work, and the installation work shall be organized such that at no time shall wiring portions of the Work be left for later installation

through retrofit or exposed means. All work shall be concealed in the finished Work, except devices.

1.4. Systems Intent

1. The intent of the Intrusion Detection System is to monitor the site area, building entrances and building interior from a remote location to detect unauthorized intrusion, monitor activity and behaviour, and to provide warning and deterrent. The system is existing, for extension by this Contract. **Note that there is no Intrusion Detection System work in this Contract, other than protection of any existing wiring or devices for such system encountered in the space of the renovation.**
2. The intent of the Access Control Systems is to provide electronic but controlled access to the Facility and aspects of the interior floor area in conjunction with opening hardware and datacom systems, all as set out in the Documents. The system is existing, for extension by this Contract.
3. The intent of the Fire Detection and Alarm System is set out in its applicable specification Section to Division 28, and/or on the Electrical Drawings. Fire alarm system work shall be by the Electrical Trade Contractor's Fire Alarm Trade, and not by the work of this Section.
4. The routing of the raceway and wiring components of these building systems shall be subject to the precedence of all other building systems, where interference with proposed routing is encountered in the Work or in relation to existing conditions. Accommodate components of other building systems in laying out new or relocated portions of this system, and make alterations to existing portions of this system to allow for alterations of existing conditions by other portions of the Work.
5. The location of devices of these systems shall be confirmed in relation to all other building systems in the existing Facility and the Work so that such devices can perform their role as components in the Electronic Safety & Security Systems. Other system components shall be installed to ensure a clear relation between devices of this system and the spaces and occupant tasks they serve. Where interference cannot be avoided by relocation of the device, provide a further device. Where such interference is brought to the Consultant's attention prior to installation of the interfering component and the device, the Consultant will instruct regarding relocations or request an additional device at Owner's expense. Where such interference is not brought to the Consultant's attention prior to installation of the interfering component, the Contractor shall provide relocation and/or additional device at no expense to the Owner where the interfering component has been installed as part of the Work.

1.5. Requirements Forming Part of the Work of this Section

1. Inspect and conform to the requirements for existing conditions, this project, and existing building as set out in Section 260300.
2. The Electrical Trade Contractor shall co-ordinate the layout and installation of conduit for the Electronic Safety & Security Systems with other building systems and existing conditions in accordance with the order of precedence for systems set out in Sections 019010 and 260300.
3. The access control and security trade contractor shall provide instruction to the Electrical trade contractor regarding conduit and rough-in requirements to the Electronic Safety & Security Systems and shall confirm the location of all devices. Include all costs for this conduit and rough-in.
4. Conform to requirements for reference standards and codes set out in Section 260300 and Division 1, including but not limited to the following applicable to this system:
 1. Referenced engineering standards and recommendations in the Electrical Divisions and Division 1;
 2. The governing electrical codes and regulations.

5. The Trade Contractors performing the work described in this Section is specifically cautioned that such work must be performed to meet the standards and requirements for supply and installation of products and materials, and related services, set out in Division 1, Section 260300, and Section 260305.
6. The Owner's nominated access control and security contractors shall provide all warranties requested in Division 1, Section 260300, and this Section. Provide warranties strictly in the format set out in Division 1, direct to the Owner. Fire Detection and Alarm System warranties are set out in the applicable fire alarm Section.

2. PRODUCTS

2.1. Devices

1. Devices for Electronic Safety & Security Systems shall be supplied and installed in strict accordance with the Owner's present standards and governing regulations. These include devices, all work at network connections points, security contacts and sensors, dedicated connections for these systems, and similar devices where noted on drawings or specified herein.
2. The Electrical Trade Contractor, and not the Electronic Safety & Security Systems Trade Contractor or Other Contractor, shall supply the cover plates to all devices, as part of the matching system of cover plates in the Work and Facility. Types of device covers shall be confirmed at Submittals stage. The Electrical Trade Contractor shall supply one cover plate for each communication system device point indicated in the Electrical drawing. This requirement is exclusive of work to the Fire Detection and Alarm Systems. Cover plates and all devices in that system shall be provided by the Fire Detection and Alarm Systems Trade Contractor.

2.2. Raceways and Wiring

1. Wiring shall be in accordance with Section 260305 Electrical Basic Materials and Methods and shall be included in the requirements for work of this Trade Contractor, except only wiring to the Fire Detection and Alarm System. Raceways shall be provided by the Electrical Trade Contractor where indicated on drawings and schedules and as specified, and are not included in any Cash Allowance.
2. Electronic Safety & Security Systems wiring may share conduit within the building with other low voltage communication systems except fire alarm or tenant systems, but may not share conduit from demarcation points within the building to outside the building. This requirement for separate conduit to and from outside the building applies to wiring in the systems that are both upstream or downstream of system equipment at demarcation points. See Documents and Owner's instructions for layout and requirements.
3. Electrical Trade Contractor shall provide all raceways for the systems to locations shown, and as set out in Section 260305.
4. Conduit within building above slab shall be EMT or rigid conduit to requirements of 260305.
5. Conduit below slabs and outside the building shall be plastic Sceptre or equivalent to requirements of 260305.
6. All cabling shall be shielded, to Cat 6 minimum and as further required for the devices and systems. Security device cabling may be shielded 18 ga. wire at minimum. Cabling for video controlled devices such as door access video (Aiphone or similar) must be fully compatible with the design and video communication signals.
7. Cabling shall be located and installed so as to eliminate interference from other electrically operated systems.

2.3. Hangers and Support

1. Products and materials for hangers and support shall be as described in Section 260305 Basic Materials and Methods and shall be included in the Work.
2. All hangers and supports, except supports for equipment, shall be provided by the Electrical Trade Contractor as part of the base contract electrical work, not the Security or Access Control Trade Contractors. The Access Control or Intrusion Detection Systems is for devices, equipment, and wiring of these system components only.
3. Cabling in accessible lay-in ceilings shall be installed to J-hooks provided by the Electrical Trade Contractor to layout shown on Electrical Drawings.

2.4. Equipment

1. All equipment for Electronic Safety & Security Systems, including routing and processing equipment, shall be provided by the respective Access Control and Intrusion Detection Trade Contractors strictly in accordance with the Owner's instructions for such equipment, with all such equipment included in the Work. .
2. All equipment for the Door Access Control System and the Intrusion Alarm System shall be as an extension to the existing systems and equipment, and to latest Owner standard.

2.5. Accessories and Appurtenances

1. All accessories and appurtenances for Electronic Safety & Security Systems shall be provided by the Access Control and Intrusion Detection Trade Contractor strictly in accordance with the Owner's present standards for such equipment, and to suit extension of the existing systems in the Facility.

2.6. External Connections

1. Electronic Safety & Security Systems may be connected to other Building Systems, including but not limited to:
 1. Barrier Free Path of Travel Systems (height of devices)
 2. Fire Separation Systems (operation of opening protection hardware by Fire Alarm signal)
 3. Emergency Egress Systems (by control and release of opening hardware)
 4. Environmental Separation Systems (by penetration of the barriers of this system by conduit, boxes, and other items in the systems)
 5. Automatic Entry Door Systems (by override or further control of these systems)
 6. Interior Finishes System (for quality of appearance in the work to Communication Systems within and to Interior Finish components)
 7. Fire Suppression Systems connections, for Fire Detection and Alarm Systems only, as set out in Section 283100.
 8. Building Monitoring System (BMS), as provided by the BMS Trade Contractor wherever so scheduled in the Work.
 9. Electrical Distribution Systems (Electrical Trade Contractor to provide power to and wire the power connection to one central equipment component of each system, and to other powered devices as set out on Electrical Drawings. Further power to other components of systems requiring such power shall be by LV by the Electronic Safety & Security Systems Trade Contractor concerned. Any backup power to the systems shall be provided by the Electronic Safety & Security Systems Trade Contractor concerned.
 10. Grounding and Bonding Systems. Electrical Trade Contractor provides grounding terminal as specified in Section 264000 and / or where indicated on drawings. Electronic Safety & Security Systems Trade Contractor for each system provides any required grounding or bonding for proper protection and operation of the system.
 11. To and from Communications Systems. Such connections shall be provided by the Communications Systems Trade Contractors concerned, working under Contract provisions as set out in Section 270500, except that commissioning of Electronic Safety & Security Systems that requires active and functioning and commissioned Communications Systems shall be performed by the Electronic Safety & Security Systems Trade Contractor

for each system. By way of example, if an Intrusion Detection System requires notification off-site to an alarm monitoring company, using a phone line or data line connection, the phone line or data line shall be commissioned by the applicable Communications Trade Contractor. The performance requirement for notification across that line to the alarm monitoring company shall be provided and commissioned by the Intrusion Detection System Trade Contractor unless already existing at the Facility.

3. EXECUTION

3.1. Preparation and Protection of Existing Portions of Systems, Select Demolition

1. Prior to installation, on site, lay out ALL exposed conduit and device locations for Consultant's acceptance. Provide concealed conduit except where authorized in writing by the Consultant. Revise conduit and device locations as directed by Consultant. Access Control and Intrusion Detection trade contractors shall provide the layout and shall inspect and approve the rough-in at building framing and rough-in stage. Submit acceptance reports.
2. Perform all work to systems in a manner that minimizes downtime for existing systems, regardless of number of mobilizations. Pay all costs for multiple mobilizations.
3. All existing components of the systems which are located in the renovated area but which serve areas beyond the renovated area shall be protected and maintained throughout the period of the construction work of this Contract. Do not proceed with any select demolition in uncertainty. Locate and confirm all wiring and components which are existing to remain. Drawings do not necessarily show these components.
4. Provide all select demolition work to portions of Communication Systems that are to be removed and abandoned within the renovated space.

3.2. General Installation

1. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.
2. Location of equipment, devices and conduit shall be neat, in consistent relation to the building structural system rhythm and the requirements of architectural layouts.
3. Verify fully all systems as required to ensure proper operation of all new devices, equipment and new system capacity.
4. Comply with the Ontario Building Code and applicable electrical standards and code, except that where such Code references regulations and standards this Contract requires installation to the latest issued amendments and supplements of such regulations and standards. Conform to the most stringent requirement in each case.
5. Comply strictly with the Owner's practices and standards for the systems, except that in case of more stringent provision in this Contract the more stringent requirement shall govern.
6. Provide conduit for all systems. No datacom or telecom wiring shall run outside of conduit except within open ceiling plenums, and only then when all cabling is plenum rated. All device locations shown on drawings for installation in walls and partitions shall be run in conduit to the nearest accessible ceiling space. All devices located in window and curtainwall framing shall be fed with wiring within the framing. Co-ordinate wiring paths and rough-in with the applicable Division 8 trade contractors.

END OF SECTION