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.1 Access and Egress

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

.2 Comply with Baycrest Centre for Geriatric Care policies and procedures, including but not limited to the following documents (attached following this Section):

.1 Baycrest Holidays and Special Days for 2017, Revised July 21, 2016; published by Baycrest Centre for Geriatric Care, 2 pages.
.2 Baycrest Guide - Contractor Trades Safety Management Package; published by Baycrest Centre for Geriatric Care April 2013, 42 pages.
.3 Baycrest Method of Procedure.
.4 Baycrest Infection Prevention and Control Guide During Construction / Renovation / Maintenance, with Appendixes A through E, published by Baycrest Centre for Geriatric Care May 2011, 19 pages.

.5 Baycrest Infection Prevention and Control Guide During Construction / Renovation / Maintenance, published Oct 06, 2014 15:47 by Baycrest Centre for Geriatric Care, 3 pages.

.3 Work at site not permitted during Holidays and Special Days as defined by Baycrest; refer to Baycrest Holidays and Special Days for 2017, Revised July 21, 2016; published by Baycrest Centre for Geriatric Care, 2 pages, attached following this Section.

.4 Smoking Restrictions:
   1. Smoking is not allowed anywhere in the vicinity of the new construction works.

1.1 WORK ZONE ISOLATION

   1. Erect hoarding as required to isolate work zones, complete with steel studs, acoustic insulation, plastic sheet (poly), gypsum board (both sides of temporary partition), and insulated hollow metal door and pressed steel frames. Paint gypsum board: colour to be selected by Consultant. Coordinate with other trades as required for complete installations.

   2. Work zones shall be isolated from adjacent spaces as required to prevent migration of dust, demolition sound, and odours. Provide insulated, painted barriers as required; doors into work zones shall be air sealed. Remove all temporary works at completion of work in each zone, and repair all damage caused by operations.

   3. Provide preventative measures to control the migration of dust particles and odours from the work zones to adjacent areas. Methods will vary depending on the location, type of construction activity and population at risk as approved by the Owner's designated Infection Control representative.

   4. Outside designated work zones, staff and building occupants' activities shall not be interfered with, and their operations, property, equipment and products in any state of manufacture shall be protected at all times from damage.

   5. Leave protection in place until Substantial Performance.

1.2 PROJECT MEETINGS

   1. Project Meetings:

      1. The purpose of the meetings is to provide a forum that permits face-to-face communications and that permits the Consultant to discharge his obligations to the Owner as required by the Contract Documents.

      2. The Contractor shall:

         1. Schedule, organize, chair and minute meetings specified and meetings required by the Consultant and/or by the Owner throughout the progress of the Work.

         2. Provide adequate meetings facilities.
.3 Distribute a written notice for each meeting to those required to attend minimum seven (7) days in advance of the meeting date. Include meeting start and end times, the location and the agenda.

.4 Record in the minutes, the names of attendees, the proceedings, decisions made, directions given and actions to be taken.

.5 Have minutes typed and distributed within three (3) Working Days of each meeting.

.6 Distribute minutes to those attending, to those affected by decisions made and directions given, and to the Owner and to the Consultants.

.7 Ensure the persons attending meetings are qualified and authorized to make decisions and provide directions on behalf of the entity each represents.

.8 Ensure relevant information is available as necessary to allow meetings to be conducted efficiently and effectively.

.3 Minutes of meetings and/or parts thereof do not form part of the Contract Documents and are not to be used at any time to describe the intent of the Contract Documents or the obligations of the parties thereto. Accordingly:

.1 Any clarification that may arise out of meetings, in order to be valid, will be issued by the Consultant in the form of a Supplemental Instruction.

.2 Any directions and decisions arising out of minutes that affect:

.1 a change in the Work;

.2 the method of adjustment or the amount of the adjustment in the Contract Price, if any;

.3 and the extent of the adjustment in the Contract Time if any, shall be valid only when confirmed by a Change Order.

.2 Pre-Construction Meetings:

.1 The construction mobilization meeting shall occur before any construction activities occur at the Place of the Work. The meetings shall be attended by the key representatives of the Owner, the Consultant, the Contractor and the major Subcontractors and Suppliers. Key representatives shall include persons that will be involved with the Project on a day to day basis and the Owner's designated infection prevention and control representative.

.2 The meeting agenda will be prepared by the Consultant. A draft of the agenda will be submitted to the Owner and to the Contractor in advance of the meeting for review and for suggestions. The agenda as approved by the Consultant shall be used for the meeting.

.3 The purpose of the meeting is to introduce the key people involved with day to day activities of the Project and to include and not necessarily be limited to the review of the following:

.1 Overview of the requirements of the Contract Documents.

.2 The construction schedule, including float time for each activity, priorities, sequencing of critical parts of the Work, and delivery of major equipment and of Products.
The Contractor's progress with the establishment of Subcontractor and Supplier contracts. (No extension of Contract Time will be granted due to tardiness with entering into agreements with Subcontractors and Suppliers thus limiting the available time to arrange the timely delivery of the specified Products and systems.)

Use of the site, including access to the areas of the Work, offices, deliveries, storage areas, control, temporary utilities, construction aids, toxic and/or smelly fumes, dust and noise control, Owner operations, security, cleanliness, waste and debris disposal, and the Owner's requirements.

Procedures for producing and maintaining record documents, spare parts, operation and maintenance manuals.

Other items as may be required by the Owner and/or the Consultant.

Progress Meetings:

.1 Schedule regular meetings every two (2) weeks and more frequently as necessary and as acceptable to the Consultant.

.2 Have the meetings attended by the Owner, the Owner's designated infection prevention and control representative, the Consultant, the Contractor's superintendents, Subcontractors and Suppliers and others as appropriate to the agenda.

.3 The meeting agenda will be prepared by the Consultant. A draft of the agenda will be submitted to the Owner and to the Contractor in advance of the meeting for review and for suggestions. The agenda as approved by the Consultant shall be used for the meeting.

.4 The suggested agenda would include and not necessarily be limited to:

.5 Review, approval and/or correction of previous meeting minutes;

.6 Review of progress of the Work related to the construction schedule;

.7 Review of off-site fabrication and delivery schedules;

.8 Corrective measures and procedures to regain projected schedules;

.9 Review of submittal requirements;

.10 Review of mock-up and sample requirements and schedules;

.11 Testing requirements and schedules;

.12 Quality standards;

.13 Pending changes and substitutions;

.14 Review of as-built records and documents; and

.15 Other business.
1.3 SHOP DRAWINGS

.1 General:

.1 Shop drawings not requested in the trade sections of the specifications will be returned without being reviewed unless prior agreement is obtained in each instance.

.2 Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures, catalogue cuts, Product, and other data which the Contractor provides to illustrate details of the Work.

.3 The Contractor shall provide shop drawings as described in the Contract Documents or as the Consultant may reasonably request. The Consultant reserves the right not to review unsolicited shop drawings.

.4 The Contractor shall review all shop drawings prior to submission to the Consultant. The Contractor represents by this review: that the Contractor has determined and verified all field measurements, field construction conditions, Product requirements; catalogue numbers; and similar data; and that the Contractor has checked and co-coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Contractor shall confirm this review of each shop drawing by stamp, date, and signature of the person responsible. The Consultant will reject without review, any and all shop drawings not stamped and signed and may require them to be resubmitted.

.5 At the time of each submission, the Contractor shall notify the Consultant in writing of any deviations in the shop drawings from the requirements of the Contract Documents. A general statement to the effect that there are or may be deviations will not be regarded as notification of deviations. Changes to the Work shall not be made through the process of reviewing shop drawings.

.6 The Contractor shall submit shop drawings to the Consultant in an orderly sequence and sufficiently in advance to prevent any delays to the Work or to the work of other contractors. Upon request of the Contractor or the Consultant, they jointly shall prepare a schedule of the dates for submission and return of shop drawings. Allow time for re-submissions of shop drawings. Shop drawings, which require approval of any legally constituted authority having jurisdiction shall be submitted to such authority by the Contractor.

.7 The Contractor shall submit shop drawings in the form specified or as the Consultant may direct. The Consultant will review and return shop drawings in accordance with the schedule agreed upon, or otherwise with reasonable promptness. The Consultant's review is for conformity to the design concept and for general arrangement only. The Consultant's review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or for meeting all requirements of the Contract Documents.

.8 Upon the Consultant's request, the Contractor shall revise and resubmit shop drawings, which the Consultant rejects as inconsistent with the Contract Documents. The Contractor shall notify the Consultant in writing of any revisions to the resubmission other than those requested by the Consultant. A general statement to the effect that there are or may be deviations will not be considered as notice.
When technical brochures, catalogue cuts, schedules and performance charts are provided as shop drawings, the Contractor shall cross out all non-relevant data prior to passing them on to the Consultant.

If the Consultant requests details of items on shop drawings which the Contractor believes are scope changes or require an extension to contract time, the Contractor shall notify the Owner and the Consultant forthwith and receive acceptance by the Owner by way of written instruction prior to proceeding with fabrication.

Contents: Clearly show:

1. interface and connecting details and arrangements of the portions of the Work to be performed by the Contractor's own forces, by the Subcontractors and by the Suppliers wherein their work comes in contact.
2. dimensioned layouts, field dimensions and clearances and other information necessary to clarify relationships of Products and assemblies to adjacent Products and assemblies;
3. identification of Products;
4. fabrication methods and details of assemblies in the factory and at the Place of the Work;
5. methods of application, methods of installation and related attachments, connections and anchors;
6. setting, erection and wiring diagrams;
7. capacities, performance characteristics, operating weights;
8. references to those parts of the Contract Documents that cover the subjects of the shop drawings;
9. items as required by the various sections of the specifications and
10. items as and when requested by the Consultant.

Numbering System: Identify, date, register, and number shop drawings to correspond with applicable section numbers of the Contract specifications. Using a specification section number as the shop drawing number prefix, commence the remainder of each number at -001 for each category and -001-R1 for first resubmission, and so forth.

(Example: Number the first submission of the first shop drawing for glazing "08 81 00-001". Number the first revised submission of the same drawing "08 81 00-001-R1").

Contractor's Distribution to Consultants:

1. The Contractor shall forward a transparency plus a white print of each shop drawing to the Consultant responsible for the preparation of the related part of the Contract Documents. Simultaneously, the Contractor shall forward a white print of each shop drawing to all the other Consultants and to the on-site representative of each Consultant. An exception to this secondary distribution will be considered where no useful contribution will result, such decision to be collectively made by the Consultants.
.2 When shop drawings consists of technical brochures, catalogue cuts, schedules and performance charts, provide six (6) copies to the Consultant responsible for the preparation of the related part of the Contract Documents and two (2) copies to each of the other Consultants.

.5 Coordination of Consultants Review: The Consultant responsible for the preparation of the related part of the Contract Documents will indicate the comments and required revisions of all Consultants affected, on the shop drawings and will stamp, date and sign them.

.6 Consultants Distribution of Reviewed Shop Drawings: The principal review Consultant will forward the stamped and signed copy of each reviewed shop drawing to the Contractor, retain a copy for record purposes, and forward copies to the other Consultants.

.7 Contractor's Final Distribution of Shop Drawings: Contractor shall distribute the final reviewed shop drawings to:

.1 the municipal building departments and to other authorities having jurisdiction.
.2 Subcontractors and Suppliers.
.3 others affected.
.4 Project closeout manual.

.8 Shop Drawings at the Place of the Work: Provide at least one (1) up- to-date set of Consultant final reviewed shop drawings at the Place of the Work, and make them immediately available to the Owner, the Consultant, Subcontractors, and Suppliers and to authorities having jurisdiction.

1.4 SAMPLES

.1 Definition: A sample is a separated part of a Product or an assembly and is an illustrative or typical example of that Product or assembly.

.2 General:

.1 The purpose of samples is to establish an acceptable quality or quality range for the Products to be incorporated into the Work.
.2 Provide samples required by and as described in the Contract Documents for the Consultant's review. Provide samples additional to those specified as the Consultant may request for the Consultant's review.
.3 Review samples obtained from Subcontractors and Suppliers before submitting them to the Consultant. The Contractor represents by the act of reviewing that he has checked and coordinated each sample against the requirements of the Contract Documents.
.4 Revise and resubmit samples rejected by the Consultant.
.5 Revise and resubmit samples for approval of colours, patterns, direction of grain, sheen, graphics, details and for quality of finish as many times as may be necessary.
.6 Submit final reviewed samples to authorities having jurisdiction, wherein authorities require samples.
.7 The Consultant's review is for conformity to the design concept only. The Consultant's review or approval does not mean the Consultant accepts responsibility for the detail design inherent within the samples. The review or approval does not relieve the Contractor from the responsibility of meeting the requirements of the Contract Documents.

.3 Deviations and Substitutions: Samples submitted with the intent or the appearance of the intent to use the samples submission process as a means of introducing substitutions to or deviations from the requirements of the Contract Documents will cause their rejection.

.4 Identification of Samples:

.1 Label each sample with the following as applicable:
   .1 Project's name
   .2 Contractor's name
   .3 Subcontractor's name
   .4 Supplier's name
   .5 Product's generic name
   .6 Product manufacturer's name
   .7 Product's trade or brand name
   .8 Product's model number and
   .9 Date of submission.

.2 Number and register samples and revised samples to correspond with the applicable section, article and paragraph numbers of the Contract specifications, using the specification section number and the applicable article and paragraph numbers within the section.

.5 Contractor's Certification:

.1 Confirm the review of each sample (including resubmission) by applying a stamp to the sample or to a tag permanently attached to the sample. Have the stamp contain the Contractor's name and the date and the signature of the Contractor's authorized representative.

.2 The Consultant will reject samples not stamped, dated or signed by the Contractor and will require them to be resubmitted.

.6 Contractor's Distribution to Consultants:

.1 In order to receive the Consultant's consideration:
   .1 Hand deliver, courier or mail samples, accompanied by a transmittal and prepaid, to the Consultant's business address or to a location designated by the Consultant;
   .2 Have the transmittal signed by the Contractor, dated and containing a complete listing of the samples being delivered;
   .3 Have samples identified and numbered as specified.

.2 Sequence the submission of samples in an orderly and timely manner.

.3 Deliver two (2) duplicates or more where specified or if requested, of each Contractor certified sample to the Consultant.
.7 Consultant's Review Coordination:

.1 The Consultant will issue a letter to the Contractor that contains the review and/or resubmission requirements.

.2 When final review is achieved, the Consultant will stamp, sign, date and deliver one of the duplicates of the sample to the Place of the Work, to serve as a quality control sample.

1.5 MOCK-UPS

.1 After samples have been approved and when requested by the Owner, the Contractor shall prepare mockups as required by the Contract Documents or as may be reasonably requested by the Owner.

.2 Mockups shall conform to standards specified for Products and workmanship, and shall include all assembly components. Mockups for approval shall be complete with all items requested, including finishes, colours, accessories, etc.

.3 The mockup is intended to allow the Owner to review design, material selection, colours and finishes, prior to the parts of the Work affected, proceeding. The mockup shall be provided by the Contractor in sufficient time to allow for review, modifications and approval, without affecting the Contract Time.

.4 The Owner may require modifications to the mockup prior to approval. Where the modifications result in a change from the design drawings and specifications, the change will be evaluated and processed in accordance with the Contract Documents.

.5 When approved, the mockup shall become the standard of acceptable work for the portion of the Work which they represent.

1.6 HEALTH AND SAFETY

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

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

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

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

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

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

.2 Whether or not such entities have been specifically identified in this Contract.
.2 Owner and Regulatory Requirements:


.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
   .1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario:

.4 Baycrest Centre for Geriatric Care, Policies and Procedures, attached, following this Section:
   .1 Baycrest Guide - Contractor Trades Safety Management Package; published by Baycrest Centre for Geriatric Care April 2013, 42 pages.
   .2 Baycrest Method of Procedure.
   .3 Baycrest Infection Prevention and Control Guide During Construction / Renovation / Maintenance, with Appendixes A through E, published by Baycrest Centre for Geriatric Care May 2011, 19 pages.
   .4 Baycrest Infection Prevention and Control Guide During Construction / Renovation / Maintenance, published Oct 06, 2014 15:47 by Baycrest Centre for Geriatric Care, 3 pages.

.3 Submittals:

.1 Submit site specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
   .1 Results of site-specific safety hazard assessment.
   .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

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

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

.4 Submit copies of incident and accident reports.

.5 Submit WHMIS MSDS - Material Safety Data Sheets.

.4 Filing of Notices:

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

.2 According to Section 5 of the Regulation for Construction Projects (O. Reg. 213/91), before beginning work at a project every constructor and employer engaged in construction has to complete an approved registration form.
.1 This form does not have to be submitted to the Ministry of Labour, but it must be at the project while the employer is working there.

.5 Safety Assessment:
   .1 Perform site-specific safety hazard assessment related to project.

.6 Meetings:
   .1 Schedule and administer Health and Safety meeting with Consultant prior to commencement of Work.

.7 Regulatory Requirements:
   .1 Do Work in accordance with REGULATORY REQUIREMENTS.

.8 General Requirements:
   .1 Develop written site specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
   .2 Consultant may respond in writing, where deficiencies or concerns are noted and may request re submission with correction of deficiencies or concerns.

.9 Responsibility:
   .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
   .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site specific Health and Safety Plan.

.10 Province of Ontario Compliance Requirements:

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

.12 Health and Safety Coordinator:
   .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
      .1 Have site related working experience specific to activities.
      .2 Have working knowledge of occupational safety and health regulations.
      .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully trained are not permitted to enter site to perform Work.
.4 Be responsible for implementing, enforcing daily, and monitoring site specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

.13 Posting of Documents:

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

.14 Correction of Non-Compliance:

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

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

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

.15 Work Stoppage:

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

.16 Fire Watch:

.1 Definitions:

.1 Hot Work: Means Work that involves open flames or Work that produces heat or sparks. Such operations include, but are not limited to, welding, brazing, cutting, grinding, soldering, thawing pipes, and cadwelding.

.2 Fire Watch: Is a person trained in the use of fire suppression equipment and alarm activation. Duties include monitoring the Work area by observation and inspection, during and after the Hot Work, to identify fire hazards and respond appropriately. A Fire Watch is required for all Hot Work. While on Fire Watch duties, no other task shall be performed.

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

.3 A Fire Watch is necessary at any time where Hot Work is performed in locations where a fire greater than a minor one might develop.

.4 Before Hot Work begins, written permission (e.g., Hot Work permit), shall be issued by the General Contractor.

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

.6 Some of the responsibilities of a Fire Watch include:

.1 Having fire extinguishing equipment readily available;

.2 Know how to sound an alarm in the event of a fire;
.3 Monitor for fires in all exposed areas, including lower decks or levels;
.4 Attempt to extinguish the fire only within the capacity of available equipment, if not sound the alarm;
.5 Monitor hot work area for at least an hour after hot work operations stop.
.7 The Fire Watch cannot have any other duties while monitoring the hot work.
.8 A Fire Watch can have no other duties during Hot Work. Continuous surveillance must be maintained throughout the course of the hot work, including a minimum 1-hour cool down period after Hot Work concludes, or longer if determined by the Contractor's health and safety risk assessment.

1.7 SPECIAL PROJECT PROCEDURES

1. Building Working Hours:
.1 Work can be carried out in the building as designated by the Owner. Any parts of the Work which are required to be carried out at times other than those listed above must be specifically arranged with the Owner. The Owner reserves the right to limit or restrict certain parts of the Work to ensure minimum disruption to the building occupants. The cost of additional security or operating staff for after hours, weekend, statutory holidays, or observances of a spiritual or cultural nature followed by the Owner, will be at the Contractor's expense.

2. Access and Deliveries:
.1 Personnel routes and material deliveries to the building are to be only by routes designated by the Owner. The handling of items that due to weight or dimension require special treatment must be reviewed and arranged with the Owner.

3. Temporary Fire Protection and First Aid:
.1 Operable fire extinguishers must be kept in the building and on the roof. These extinguishers must be of sufficient number and suitable types to combat a potential fire in the work area as required by codes and bylaws.
.2 The Contractor shall ensure that adequate first aid facilities are available.

4. Welding, Brazing, Soldering:
.1 All welding or brazing must be performed only with the prior consent of the Owner. Proposed welding, brazing or soldering, or anything else likely to activate a smoke detection system, must be approved in writing by the Owner in advance of the work being performed.

5. Fireproofing and Firestopping:
.1 All fireproofing material removed shall be replaced with a suitable and approved fireproofing material, and said replacement material shall be installed in accordance with pertinent building and fire codes. In no case will the original level of protection be reduced. Asbestos is specifically prohibited for use as a fireproofing material.
.2 All openings in risers must be sealed with approved fire-stop material.
.6 Shutdown of Utilities:

.1 All requests for shutdowns of electrical power, air systems and water system (fire line, domestic water, etc.) must be made in writing to the Owner and submitted for approval at least five (5) working days prior to the required shutdown date. All costs inclusive of additional security or operating staff for after hours, weekends, or statutory holidays will be at the Contractor's expense.

.7 Plumbing:

.1 Where plumbing, roof drains are removed from the leased premises, all water supply drain lines and vent connections must be removed from the ceiling spaces back to the core riser, and properly valved and/or capped.

.2 The Owner's designated Infection Prevention & Control representative is to be notified in advance of all water and steam shutdowns. Appropriate procedures must be followed throughout the Project to ensure the potability of water in the health care facility.

.8 Heating, Ventilation, Air Conditioning (HVAC):

.1 All intake and exhaust vents/grills within work zone must be identified. Where dust will be produced these vents/grills must be sealed off prior to commencement of Work to prevent contamination of HVAC systems. HVAC systems to be inspected for evidence of dust/water contamination and cleaned to approval of Owner's designated Infection Prevention & Control Representative prior to Substantial Performance of the Work.

.2 If HVAC systems have been de-commissioned for the Project, HVAC systems must be re-commissioned prior to Substantial Performance of the Work. Documentation to be provided to Owner's designated Infection Prevention & Control representative regarding cleaning of HVAC system, viability of HEPA filters (if applicable), air balancing and direction of air flow. Occupied spaces must have functioning HVAC systems throughout the Project. All shutdowns affecting occupied areas must be communicated to Owner's designated Infection Prevention & Control representative in advance to determine if alternative means of air are required.

.3 At the beginning and for the duration of Work all intake grills will be identified and sealed with a filter to prevent contamination. The internal pre-filter and primary filter for these air intakes will be monitored throughout the Project and changed as required. The Owner's designated Infection Prevention & Control representative and Contractor will monitor the HVAC systems and determine if air monitoring is necessary.

.9 Air Conditioning Units:

.1 Where air conditioning units are disconnected, the units must be fully serviced by the Contractor before being reconnected to the building system. Notice of such disconnections must be submitted in writing to the Owner. All costs are to be at the Contractor's cost in accordance with the Owner's requirements.
.2 The Contractor shall provide temporary filters, during occupant's work, new filters at the completion of work and, at the discretion of the Owner, is responsible to clean ducts and coils if necessary. Should it be necessary for the Owner's forces to provide temporary or new filters, it shall be at the Contractor's expense.

1.8 REGULATORY REQUIREMENTS

.1 References and Codes:

.1 Work shall comply with or exceed the requirements of the Ontario Building Code 2012 and Amendments, and other codes, laws, regulations, ordinances and by-laws of federal, provincial or local application provided that in case of conflict or discrepancy, the more stringent requirements apply. Conflicts or discrepancies shall be resolved at the sole and final discretion of the Consultant.

.1 The Work shall meet or exceed the requirements of CSA Z317.1-16, Special requirements for plumbing installations in health care facilities, and CAN/CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

.2 The Work shall be executed in a manner consistent with the general design and construction intent of the following guidelines published by the Facilities Guidelines Institute (FGI):


.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Standards, codes, and documents referenced in the technical Specifications, Divisions 02 and following.

.2 Municipalities:

.1 The work shall comply with or exceed the requirements of by-laws and ordinances of the City of Toronto and the direction of authorities having jurisdiction as determined by the Consultant.

1.9 QUALITY CONTROL

.1 Contractor Quality Control:

.1 Prior to the start of construction activities, the Contractor shall submit a quality control program and schedule of quality control activities that is satisfactory to the Owner. The Contractor shall implement the program so that the Work is designed and constructed in accordance with the requirements of the Contract Documents.

.2 The Owner's review of the Contractor's quality control program or the results there under shall not negate the Contractor's responsibility for meeting the requirements of the Contract Documents.
.3 The Owner shall have the right at any time throughout the course of the Work to arrange for independent inspections and testing of various components of the Work. The Contractor shall fully cooperate and provide assistance as necessary to ensure that independent inspection or testing is properly and efficiently performed in a timely manner.

.2 Discrepancies and Omissions:

.1 The Contractor shall notify the Consultant of any discrepancies in or omissions from the Contract Documents or of any doubts as to the meaning or intent of any part thereof. The Consultant will issue instructions, clarifications or explanations.

1.10 TEMPORARY UTILITIES

.1 Temporary Power:

.1 Electric power is available for construction use. The Contractor shall ascertain the characteristics of the available power and the connection locations. Should the characteristics of the available electric power not be satisfactory to the Contractor, the Contractor shall provide his own.

.2 The location of the power sources shall be as directed by the Owner. The Contractor shall not connect to any other power sources.

.3 Under no circumstances over-load the Owner's electrical power system.

.4 Provide the means of distribution of power from the Owner's power source to the Work locations.

.5 Remove the temporary power distribution devices and restore surfaces damaged due to installation and removal of temporary power, prior to the Owner's take-over of the respective parts of the Work.

.6 The Contractor shall pay for the consumption of its electrical power.

.2 Temporary Lighting:

.1 The Contractor shall provide task lighting necessary for the execution of the Work and for safety.

.2 Locate and secure lighting systems to prevent displacement, falling or interference.

.3 Provide devices to protect fixtures, bulbs and tubes from accidental breakage.

.4 Remove temporary lighting from the areas of the Work and restore surfaces damaged due to installation and removal of temporary lighting, prior to the Owner's take-over of the respective parts of the Work.

.3 Temporary Water:

.1 The Owner will make potable water available for the Contractor's use in the construction of the Work. The Contractor shall pay for the amount of water thereby consumed. The Contractor shall make connections to the Owner's water supply at locations approved by the Owner and provide vessels, hoses, and other devices to transport water to the areas of the Work.

.2 Prevent slip hazard due to water spillage.
.3 Remove vessels, hoses, and other devices for the transport of water from the areas of the Work and restore surfaces damaged due to water damage, and due to the installation and removal of vessels, hoses, and other devices for the transport of water prior to the Owner's take-over of the respective parts of the Work.

.4 Temporary Heating:
.1 The Contractor shall provide and pay for additional heat as may be necessary for the execution of the Work or parts thereof, to supplement the existing heat in the area of the Work.
.2 Temporary heat sources to be provided by the Contractor shall be electricity powered.

.5 Fire Extinguishers:
.1 Provide and maintain in proper order at least five (5) fire extinguishers in each work area, or more if necessary due to the scope and nature of the Work being performed, prominently placed, until completion of the Work.
.2 Fire extinguishers shall be in accordance with local authorities having jurisdiction.
.3 Remove fire extinguishers from the Place of the Work upon completion of the Work.

.6 Welding:
.1 Where gas welding or cutting is to be done within 3000 mm of combustible material or above combustible material or above spaces that may be occupied by persons, provide protective shields of non-combustible material.
.2 Place tanks supplying gases for welding or cutting at no greater distance from the Work than is necessary. Securely fasten tanks in an upright position. Do not expose the tanks to sunlight or to high temperature.

.7 Temporary Ventilation:
.1 Ensure odours, dust, gasses and volatile materials due to construction activities do not enter into the building or into the building's mechanical systems.

.8 Temporary Use of New and Existing to Remain Utility Services and Equipment
.1 Do not use any new and existing to remain permanent utility services or equipment.

1.11 CONSTRUCTION FACILITIES

.1 Construction Compound:
.1 A small area will be provided on the site for the Contractor's construction compound. This area must contain any temporary offices, construction equipment, materials storage and limited parking for about five cars.
.2 The construction compound shall be enclosed by chain link fencing and shall be equipped with lockable gates. Posts for the fencing shall be the type that does not penetrate into pavement or soil yet still provides adequate lateral support for the fencing.
2 Installation and Removal:
   1 Provide construction facilities in order to execute Work expeditiously.
   2 Maintain the temporary facilities for the duration of the Project, unless directed otherwise.
   3 Provide temporary facilities that meet the requirements of the authorities having jurisdiction.
   4 Maintain all temporary facilities clean and free from nuisances so as to avoid damage to property or structures, and to minimize complaints from construction personnel or citizens residing adjacent to the site.
   5 Remove construction facilities from the Place of the Work after use. Make good any damages caused by their use and removal.

3 Scaffolding:
   1 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs.

4 Storage>Loading:
   1 Confine construction activities, storage and operations within the Place of the Work and within the construction compound. No storage is available to the Contractor in the building or elsewhere on the Owner's property.
   2 Do not load any part of the building with a weight or force that will endanger the building or the Work.

5 Signage:
   1 No signage is permitted except for the Project identification sign and for warning signs necessary for safety and for signage related to construction traffic flow on to and on the site.

1.12 TEMPORARY BARRIERS AND ENCLOSURES

1 Installation and Removal:
   1 Provide temporary barriers and enclosures for protection of the public, the building occupants and for the protection of the Work. Ensure that existing fire/emergency exits are not compromised.
   2 Remove temporary barriers and enclosures after use.

2 Dust Control:
   1 Provide preventative measures to control the migration of dust particles from the work zones to adjacent areas. Methods will vary depending on the location, type of construction activity and population at risk as approved by the Owner's designated Infection Prevention & Control representative.
.3 Guard Rails and Barricades:
  .1 Provide secure, rigid guard rails and barricades around openings in elevator
      shafts.
  .2 Locations and types and design of temporary guard rails and barricades shall be as
      required by governing authorities and as necessary to achieve a safe working
      environment.

.4 Protection of Building Occupants' Operations and Property:
  .1 The building occupants' activities shall not be interfered with and their operations,
      property, equipment and products in any state of manufacture shall be protected at
      all times from damages.

1.13 COMMON PRODUCT REQUIREMENTS
  .1 Standards and Codes:
    .1 Contract forms, codes, specifications, standards, manuals and installation,
      application and maintenance instructions, referred to in the specifications unless
      otherwise specified and unless stated otherwise in the governing building code,
      shall be the latest published editions at the date of the Contractor's bid
      submission.
    .2 Conform to standards, in whole or in part, as specifically stated in the
      specifications.
    .3 If there is a question as to whether any Product or system is in conformance with
      applicable standards, the Consultant reserves the right to have such Products or
      systems tested at the Contractor's cost to prove or disprove conformance.
    .4 The cost for such testing will be borne by the Owner in the event of conformance
      with the Contract Documents or by the Contractor in the event of non-
      conformance.

1.14 PRODUCTS AND MATERIALS
  .1 Specified Options:
    .1 Work of this Contract is based on Products specified by:
      .1 Manufacturers' catalogued trade names and/or
      .2 References to Standards, i.e. CAN, CGSB, CSA, ASTM or
      .3 Prescriptive specifications or
      .4 Performance specifications.
    .2 When only one manufacturer's catalogued trade name is specified, Provide only
      that catalogued trade name, material or Product.
    .3 When more than one manufacturer's trade name is specified for a Product, the
      Contractor may select the Product from those specified.
    .4 When more than one manufacturer's trade name is specified along with a
      referenced standard, the choice is the Contractor's on condition the Product
      complies with the referenced standard.
.5 When a Product is specified by reference to a standard only, or a standard as amended by the specifications, the Contractor may select any Product that meets or exceeds the specified standard and specified amendments.

.6 When a Product is specified by a prescriptive specification or by a performance specification, the Contractor may select any Product meeting or exceeding the specification.

.7 When a Product is specified by reference to a standard or by a prescriptive specification or by a performance specification, the Contractor upon request of the Consultant and at no cost to the Owner, shall obtain from the manufacturer or Supplier, a current and applicable independent testing laboratory report that shows the Product meets or exceeds the specified requirements.

.2 Number of items: In cases where an assembly or a Product is referred to in the singular number, it is intended that such reference mean as many assemblies or Products as necessary shall be provided to complete the Work.

.3 Quality:

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

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

.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.

.4 Trademarks and Labels:

.1 Trademarks and labels, including applied trademarks and labels, are not acceptable in the finished Work, except those required for operating instructions, or when located in mechanical, electrical and control rooms.

.2 Remove trademarks and labels by grinding, if necessary, painting out where the particular surface is being painted or if on plated parts, replace with new plain plated or non-ferrous metal parts.
Availability:

.1 Immediately upon award of the Contract, preview Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products 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 the performance of the Work.

.2 In the event of failure to notify the Consultant at commencement of the Work and should it subsequently appear that the Work may be delayed for such reason, the Contractor shall, as determined by the Consultant and at no increase in the Contract Price, temporarily install another Product until such time as specified Product becomes available, at which time the temporarily installed Product shall be removed and the specified Product installed.

Storage, Handling and Protection:

.1 Handle and store Products in a manner to prevent damage, adulteration, deterioration and soiling to the Products, other building components, assemblies, other products, the structure, the site and surrounding property and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled Products in original and undamaged condition, with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work, except where otherwise specified for a specific item.

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

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

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

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

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

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

.9 The Contractor shall schedule deliveries so as to minimize storage at the site, but without causing delays due to late deliveries.

.10 The Contractor shall take delivery of and off-load Products promptly and any charges due to delays in off-loading shall be borne by the Contractor. Ensure damage to Products prior to off-loading is duly reported to the Supplier and the carrier.

.11 The Contractor shall locate Products such that proper inspection thereof may be carried out.

.12 Do not store Products that may be detrimental to finished surfaces where finishing has commenced or has been completed.
.13 The Contractor shall be responsible for any additional handling or transportation of the Products that is necessary.

.14 The Contractor shall after installation and before initial operations, protect Products against, weather, dust, dirt and dampness in a manner satisfactory to the Owner and the Consultant and in accordance with the manufacturer's instructions.

.15 The Contractor shall be responsible for rectifying any damage to Products, ensuring such repairs are acceptable to the Owner, Owner's Consultant and to the Product manufacturer so that warranties and guarantees are not invalidated.

.7 Transportation:

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

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

.8 Owner Supplied Products:

.1 The Contractor shall co-ordinate with the Owner, the Owner's other contractors and tenant contractors any off-loading, storage and protection of materials, furniture and fixtures performed by the Owner, Owner's contractors and tenant contractors to minimize traffic and congestion.

.2 The Contractor shall be responsible for the off-loading, storage, placement, and protection of any owner procured materials and equipment, in accordance with the Work, to the same extent that it is responsible for Products, in accordance with the requirements as set out in paragraph 6 Storage, Handling and Protection.

.9 Deliveries:

.1 The Contractor shall arrange for delivery of Products, construction equipment and temporary facilities to arrive when needed, and at times to minimize interference with vehicular traffic on the streets, and with pedestrian traffic on sidewalks.

.2 The Contractor and other contractors shall co-ordinate their respective deliveries, especially in respect to the use of elevators and loading docks.

1.15 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify the Consultant in writing, of conflicts between the specifications and manufacturer's instructions, so that the Consultant may establish the course of action.

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

.1 General:

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

.2 Do not employ any unfit person or anyone unskilled in their required duties.

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

.2 Examination of Site and Documents:

.1 Make a careful examination of the Place of the Work and investigate, at no cost or risk to the Owner, matters relating to the nature of the Project to be undertaken, the means of access and egress thereto and therefrom, the obstacles to be met with and the rights and interests which may be interfered with during the performance of the Work.

.2 Make a careful examination of the extent of the Work to be performed and any and all matters which are referred to in the Contract Documents, or which are necessary for the full and proper construction of the Project and the conditions under which it will be performed.

.3 Examination of Surfaces and Conditions:

.1 The Contractor shall ensure each Subcontractor examines job conditions and the Work to which his work is to be applied, anchored or connected.

.2 Report unsatisfactory conditions likely to prevent the proper installation of Work.

.3 Commencement of the Work implies acceptance of conditions.

.4 Documents on Site: Keep on the site at all times, one copy of the drawings and specifications, including a Consultant's reviewed and stamped set of all shop drawings, coordination drawings, and interference drawings.

.5 Coordination:

.1 Ensure Subcontractors cooperate with each other to ensure the execution of the Work is carried out expeditiously, and is satisfactory in all respects.

.2 Ensure Subcontractors examine the Contract Documents covering the Work and in particular, those parts that affect the execution and performance of their own parts of the Work.

.3 From time to time, examine the work of all Subcontractors and have corrected defects and deficiencies which may adversely affect the Work.

.4 Ensure that Work is in compliance with the Contract Documents and accept responsibility for delays or costs resulting from failure to inspect, and any replacement required.

.5 Be responsible for damage of any kind to the Work. Replace any materials or work so damaged that cannot be repaired or restored to the Consultant's satisfaction. Such repairs or replacements shall be made by the trade that performed the original work.
.6 Ensure that all Subcontractors cooperate with other Subcontractors whose work attaches to or is affected by their own work, and ensure that minor adjustments are made to make adjustable work fit to fixed work.

.7 Ensure that Subcontractors requiring foundations or openings to be left for the installation of their work furnish the necessary information to the Subcontractors concerned in ample time.

.8 Items to be built-in shall be supplied as and when required by the Subcontractor building in the items together with forms, templates, anchors, sleeves, inserts, measurements, shop drawings and accessories required to be fixed to or inserted in the Work and set in place, or instruct the related Subcontractors as to their location.

.9 Pay the cost of extra work caused by, and make up time lost as the result of, failure to provide the necessary cooperation, information or items to be fixed to or built into the work in adequate time.

.10 Cooperate with other contractors working on and in the vicinity of the site.

.6 Setting Out:

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

.7 Dimensions:

.1 Wall thicknesses shown on the drawings are nominal only. In all cases, determine the actual sizes at the building.

.2 Dimensions of shop fabricated portions of the building shall be verified on the site before shop drawings and fabrication are commenced.

.3 Where dimensions are not available before fabrication is commenced, the dimensions required shall be agreed upon between the various trades concerned.

.4 The Owner will not accept claims for extra expense on the part of the Contractor by reason of non-compliance with this article.

.8 Concealment:

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

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

.9 Location of Fixtures:

.1 Location of plumbing, heating and electrical fixtures and outlets, ducts, conduits and pipes shown or specified but not dimensioned shall be considered approximate.

.2 Consult with the Consultant to determine the actual location of items not dimensioned as may be required to suit job conditions.

.3 Relocation caused by failure to determine the actual locations shall be executed without charge to the Owner.

.4 Inform the Consultant of a conflicting installation. Install as directed.
.10 Fastenings:

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

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

.3 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

.7 The Contractor shall supply fastenings, anchors and accessories as required for the fabrication and erection of the Work.

.8 The Contractor shall provide adequate instruction and/or templates and, if necessary, supervise installation where fastenings or accessories are required to be built into work of other sections.

.11 Powder Actuated Fastenings:

.1 Powder actuated fasteners shall not be used for the support of ceilings.

.2 Powder actuated fastenings shall not be used on any portion of the Work, unless written consent for a specific use is obtained from the Consultant.

.3 Only low velocity tools will be permitted under any condition. Operators to be qualified and to be in possession of a valid operator's certificate. Tools and operation shall conform to CAN3-Z166.5-Series.

.12 Protection of Work in Progress:

.1 Adequately protect work completed or in progress, existing buildings and equipment, lawns, trees, fencing, service poles, wires, utilities above and below ground, and paving located on this and adjoining properties. Work and items damaged or defaced due to failure in providing such protection are to be removed and replaced, or repaired, as directed by the Consultant, at no increase in Contract Price.

.13 Overloading:

.1 Prevent overloading of any part of the building, structure, falsework, form work and scaffolding. Do not cut, drill or sleeve any load bearing members unless specifically indicated, without written approval of the Consultant. Make good any damages due to overloading at no cost to the Owner.
1.17 PRODUCT OPTIONS

.1 Requests for substitutions are not permitted without prior written approval. Refer to Products and Materials section for timing and cost ramifications.

.2 Have requests for substitutions contain:

- Fully detailed and clear descriptions.
- Cost of items proposed to be substituted and the cost of the items proposed.
- Evidence of compliance with applicable Building Codes, with applicable standards and with requirements of authorities having jurisdiction.
- Evidence of compatibility and interface with adjacent building products, components and systems.
- Reason for the request.

.3 Proposals will be considered if:

- None of the specified choices of Products, components and systems are available.
- Products, components or systems proposed are considered by the Consultant as being significantly better than those specified.
- Other equivalent quality products would result in a cost savings to the Owner.
- Should a proposed substitution be accepted in part or in whole, assume full responsibility and costs wherein the substitution affects other products, components and systems.
- Pay for changes to the Contract Documents incurred as a result of an acceptance of a substitution.
- Substitutions submitted initially on a shop drawing may cause the shop drawing to be rejected. Consultant's review of a shop drawing containing a substitution shall not be construed as an approval of a substitution.

1.18 CLOSEOUT PROCEDURES

.1 Inspection and Declaration Procedures:

- Contractor's Inspection:
  - The Contractor and all Subcontractors shall conduct an inspection of the Work, identify deficiencies and defects; repair as required to conform to Contract Documents. Notify the Consultant in writing of satisfactory completion of Contractor's inspection and that corrections have been made. Request a Consultant's inspection.

- Consultant's Inspection:
  - Consultant and Contractor will perform an inspection of the Work to identify obvious defects or deficiencies and assign a schedule of values to the noted defects or deficiencies. Contractor shall correct the Work accordingly.

- Completion:
  - Submit a written certificate that the following have been performed:
  - Work has been completed and inspected for compliance with Contract Documents.
.3 Defects have been corrected and deficiencies have been completed.
.4 Equipment and systems have been tested, adjusted and balanced and are fully operational.
.5 Operation of systems have been demonstrated to Owner's personnel, and
.6 Work is complete and ready for Final Inspection.

.4 Final Inspection:
.1 When items noted above are completed, request a final inspection of the Work by Owner, Consultant and Contractor. If Work is deemed incomplete by Consultant, complete outstanding items and request a re-inspection.

.5 Declaration of Substantial Performance:
.1 When the Consultant considers that deficiencies and defects have been corrected and the Contract has been substantially performed, make application for certificate of Substantial Performance.

.6 Commencement of Warranty Periods:
.1 Date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for the warranty periods.

.7 Final Payment:
.1 When the Consultant considers final deficiencies and defects have been totally performed, and following completion of lien period, submit claim for final payment. If Work is deemed incomplete by Consultant, complete outstanding items and request re-inspection.

.8 Re-inspection:
.1 Should status of the Work require re-inspection by Consultant due to failure of Work to comply with Contractor's claims for inspection, Owner will deduct amount of Consultant's compensation for re-inspection services from payment to Contractor.

1.19 CLOSEOUT SUBMITTALS

.1 Project Record Documents:
.1 Administrative:
.1 Prepare instructions and data by personnel experienced in maintenance and operation of described Products.
.2 Submit one copy of completed project record documents volume in final form ten (10) working days prior to application for date of Substantial Performance of the Work.
.3 The copy will be returned with the Consultant's comments.
.4 Prior to Substantial Performance of the Work, submit to the Consultant three (3) final copies of Operating and Maintenance Manuals amended in accordance with the Consultant's comments.
Format:

1. Organize data in the form of an instructional manual.
2. Use commercial quality D-ring three-ring binders. Rings shall be 219 x 279 mm maximum.
3. When multiple binders are used, correlate data into related consistent groupings.
4. Identify each binder with typed or printed title Project Record Documents. Include the name of the Project, and a brief description of the contents as part of the identification.
5. Arrange contents by section numbers and by the order of document 00 01 10 LIST OF CONTRACT DOCUMENTS.
6. Provide tabbed fly leafs for each Product and system, bearing a typed description of the Product and/or System.
7. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

Contents - Each Volume:

1. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Consultants and Contractor with name of responsible parties; schedule of Products and systems, indexed to content of the volume.
2. Each Product or System: List names, addresses and telephone numbers of Subcontractors and Suppliers, including local source of supplies and replacement parts.
3. Product Data: Mark each sheet to clearly identify specific Products and component parts, and data applicable to installation; delete inapplicable information.
4. Drawings: Supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
5. Typewritten Text: As required to supplement Product data, provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

Recording Actual Site Conditions:

1. The Contractor shall maintain throughout the duration of the construction of the Work, one complete set of current "issued for construction" white prints of the Contract Drawings for the purpose of recording as-constructed conditions on the Contract Drawings. These prints shall be available at all times for inspection by the Owner or the Owner's Consultant.
2. Do not conceal work until required information is recorded.
.3 The Contractor shall record all modifications and deviations made to the construction drawings as they relate to locations, elevations, dimensions, curbs and other important elements including, but not limited to, drains, mechanical and electrical equipment and associated works, and other significant deviations or changes which are concealed in the construction and cannot be identified by visual inspection.

.4 The Contractor shall carefully indicate the said locations, elevations, and dimensions showing their perpendicular distance from known visible reference points such as column lines, etc.

.5 Prior to Substantial Performance of the Work and allowing sufficient time for Owner and Owner's Consultant's review, the Contractor shall transfer the information from the marked-up white prints to the CAD drawing file. The Contractor shall submit to the Owner the CAD disk file and one set of reproducible mylars and one set of prints certified as "as-built" drawings. The submission of certified "as-built" drawings shall be completed prior to requesting a date of Substantial Performance of the Work.

.6 Specifications: Procedures and submission of as-built specifications shall be as per "as-built" drawings. Legibly mark each item to record actual construction, including:

  .1 Manufacturer, trade name, and catalogue number of each Product actually installed, particularly optional items and substitute items.

  .2 Changes made by Addenda and Change Orders.

.7 Other Documents: Include manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.5 Warranties and Bonds:

  .1 Separate each warranty or bond with index tab sheets keyed to the List of Contents listings.

  .2 List Subcontractors, Suppliers and Manufacturers, with name, address, and telephone number of their responsible principals.

  .3 Obtain warranties and bonds, executive in duplicate by Subcontractors, Suppliers and manufacturers, within ten days after completion of the applicable item of Work.

  .4 Retain warranties and bonds until time specified for submittal.

END OF SECTION
1 GENERAL

1.1 Allowances included herein are for items of Work which could not be fully quantified prior to Bidding.

1.2 Expend each allowance as directed by the Consultant in writing. Work covered by allowances shall be performed for such amounts and by such persons as directed by the Consultant.

1.3 Each allowance will be adjusted to actual cost as defined hereunder and the Contract Price will be amended accordingly by Contract Change Order.

1.4 Progress payments for Work and Products authorized under allowances will be made in accordance with the payment terms set out in the Conditions of Contract.

1.5 A schedule shall be prepared jointly by the Consultant and Contractor to show when items called for under allowances must be authorized by the Consultant for ordering purposes so that the progress of the Work will not be delayed.

1.6 Where a Cash Allowance is for work performed under a Subcontract, the Contractor shall Bid the work involved and submit Bids received, with the Contractor’s recommendations, for approval.

2 CASH ALLOWANCE(S)

2.1 Cash allowances, unless otherwise specified, cover the net cost to the Contractor of services, Products, construction machinery and equipment, freight, handling, unloading, storage, installation where indicated, and other authorized expenses incurred in performing the Work. Cash allowances shall not be included by a Subcontractor in the amounts for their Subcontract work.

2.2 Supply only allowances shall include:
   .1 Net cost of Products.
   .2 Delivery to Site.
   .3 Applicable taxes and duties, excluding HST.

2.3 Supply and install allowances shall include:
   .1 Net cost of Products.
   .2 Delivery to Site.
   .3 Unloading, storing, handling of Products on Site.
   .4 Installation, finishing and commissioning of Products.
   .5 Applicable taxes and duties, excluding HST.
2.4 Inspection and Testing allowances shall include:
   .1 Net cost of inspection and testing services.
   .2 Applicable taxes and duties, excluding HST.

2.5 Other costs related to work covered by cash allowances are not covered by the allowance but shall be included in the Contract Price.

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

2.7 Progress payments on accounts of work authorized under cash allowances shall be included in the monthly Certificate For Payment.

2.8 Submit, before application for final payment, copies of all invoices and statements from suppliers and Subcontractors for work which has been paid from cash allowances.

2.9 Include in the Bid Price the amount of each cash allowance:

   .1 Unforeseen Equipment Coordination $25,000.00

END OF SECTION
1.1 WASTE MANAGEMENT REQUIREMENTS

.1 Prior to start of Work, conduct meeting with Consultant to review and discuss Waste Management Plan.

.2 Waste Management Requirements: comply with Province of Ontario and City of Toronto requirements for waste diversion, transportation and management.

.3 To the extent economically and logistically reasonable, reduce solid waste produced by Work in accordance with CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

.4 Comply with Ontario Ministry of the Environment Regulations 102/94 and 103/94.

.5 The Contractor shall be responsible for the Material Recovery Plan, Waste Reduction Plan and Construction Management Plan, as required by the municipality. This information shall be submitted to the appropriate department of the municipality for approval prior to commencement of Work by the Contractor.

1.2 DEFINITIONS

.1 Class III: non-hazardous waste - construction renovation and demolition waste.

.2 Demolition Waste Audit (DWA): relates to actual waste generated from project.

.3 Inert Fill: inert waste - exclusively asphalt and concrete.

.4 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.5 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.6 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.7 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.8 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.9 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.10 Separate Condition: refers to waste sorted into individual types.

.11 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
.12 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.13 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.14 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:

.1 Waste Audit.
.2 Waste Reduction Workplan.
.3 Material Source Separation Plan.
.4 Schedules A, B, and C completed for project.

1.4 SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:

.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
.3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
.4 Submit 2 copies of Materials Source Separation Program (MSSP) description.

1.5 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.
1.6  **WASTE REDUCTION WORKPLAN (WRW)**

1. Prepare WRW prior to project start-up.

2. WRW should include:
   1. Destination of materials listed.
   2. Deconstruction/disassembly techniques and sequencing.
   4. Location.
   6. Protection.
   7. Clear labelling of storage areas.
   8. Details on materials handling and removal procedures.
   9. Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

3. Describe management of waste.

4. Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

5. Post WRW or summary where workers at site are able to review content.

6. Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

7. Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

1.7  **DEMOLITION WASTE AUDIT (DWA)**

1. Prepare DWA prior to project start-up.

2. Complete DWA: Schedule C.

3. Provide inventory of quantities of materials to be salvaged for reuse, recycling, or disposal.

1.8  **MATERIALS SOURCE SEPARATION PROGRAM (MSSP)**

1. Prepare MSSP and have ready for use prior to project start-up.

2. Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Consultant.

3. Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

4. Provide containers to deposit reusable and recyclable materials.

5. Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Consultant.

.2 Unless specified or indicated on Drawings otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Consultant.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Remove comingled materials to off-site processing facility for separation.

.3 Provide waybills for separated materials.

1.10 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

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

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.
1.11 USE OF SITE AND FACILITIES
.1 Execute work with least possible interference or disturbance to normal use of premises.
.2 Maintain security measures established by existing facility, and also provide temporary security measures approved by Consultant when required to assure continuity of security.

1.12 SCHEDULING
.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

1.13 APPLICATION
.1 Do Work in compliance with WRW.
.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

1.14 CLEANING
.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.
.3 Source separate materials to be reused/recycled into specified sort areas.

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Sample Schedules A, B and C Follow
## WASTE AUDIT (WA)

### Schedule A - Waste Audit (WA):

<table>
<thead>
<tr>
<th>Material Category</th>
<th>Material Quantity Unit</th>
<th>Estimated Waste %</th>
<th>Total Quantity of Waste (unit)</th>
<th>Generation Point</th>
<th>% Recycled</th>
<th>% Reused</th>
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<tbody>
<tr>
<td>Wood and Plastics</td>
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<td>Material Description</td>
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<tr>
<td>Off-cuts</td>
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<tr>
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<td>Cardboard Packaging</td>
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<td>Other</td>
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<td>Doors and Windows</td>
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</table>
## WASTE REDUCTION WORKPLAN (WRW)

### Schedule B:

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<tr>
<th>Material Category</th>
<th>Person(s) Responsible</th>
<th>Total Quantity of Waste (unit)</th>
<th>Reused Amount (units) Projected</th>
<th>Actual</th>
<th>Recycled Amount (unit) Projected</th>
<th>Actual</th>
<th>Material Destination</th>
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### 1.17 DEMOLITION WASTE AUDIT (DWA)

#### Schedule C - Demolition Waste Audit (DWA):

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<th>Quantity</th>
<th>Unit</th>
<th>Total</th>
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<th>Weight (cum)</th>
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<tr>
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<tr>
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<tr>
<td>WD Door Trim</td>
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<tr>
<td>Cabinet</td>
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<td>Doors and Windows</td>
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<tr>
<td>Panel Regular</td>
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</table>

END OF SECTION
1.1 WASTE MANAGEMENT REQUIREMENTS

1. Prior to start of Work, conduct meeting with Consultant to review and discuss Waste Management Plan.

2. Waste Management Requirements: comply with Province of Ontario and City of Toronto requirements for waste diversion, transportation and management.


5. The Contractor shall be responsible for the Material Recovery Plan, Waste Reduction Plan and Construction Management Plan, as required by the municipality. This information shall be submitted to the appropriate department of the municipality for approval prior to commencement of Work by the Contractor.

1.2 DEFINITIONS


2. Demolition Waste Audit (DWA): relates to actual waste generated from project.


4. Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

5. Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

6. Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

7. Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

8. Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
   1. Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
   2. Returning reusable items including pallets or unused products to vendors.

9. Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

10. Separate Condition: refers to waste sorted into individual types.

11. Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
.12 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.13 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.14 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:

.1 Waste Audit.
.2 Waste Reduction Workplan.
.3 Material Source Separation Plan.
.4 Schedules A, B, and C completed for project.

1.4 SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:

.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
.3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
.4 Submit 2 copies of Materials Source Separation Program (MSSP) description.

1.5 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.
1.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include:
   .1 Destination of materials listed.
   .2 Deconstruction/disassembly techniques and sequencing.
   .3 Schedule for deconstruction/disassembly.
   .4 Location.
   .5 Security.
   .6 Protection.
   .7 Clear labelling of storage areas.
   .8 Details on materials handling and removal procedures.
   .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

.3 Describe management of waste.

.4 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

.5 Post WRW or summary where workers at site are able to review content.

.6 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

.7 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

1.7 DEMOLITION WASTE AUDIT (DWA)

.1 Prepare DWA prior to project start-up.

.2 Complete DWA: Schedule C.

.3 Provide inventory of quantities of materials to be salvaged for reuse, recycling, or disposal.

1.8 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Consultant.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
LOCATE SEPARATED MATERIALS IN AREAS WHICH MINIMIZE MATERIAL DAMAGE.

COLLECT, HANDLE, STORE ON-SITE, AND TRANSPORT OFF-SITE, SALVAGED MATERIALS IN SEPARATE CONDITION.

COLLECT, HANDLE, STORE ON-SITE, AND TRANSPORT OFF-SITE, SALVAGED MATERIALS IN COMBINED CONDITION.

1.9 STORAGE, HANDLING AND PROTECTION

STORE, MATERIALS TO BE REUSED, RECYCLED AND SALVAGED IN LOCATIONS AS DIRECTED BY CONSULTANT.

UNLESS SPECIFIED OR INDICATED ON DRAWINGS OTHERWISE, MATERIALS FOR REMOVAL BECOME CONTRACTOR'S PROPERTY.

PROTECT, STOCKPILE, STORE AND CATALOGUE SALVAGED ITEMS.

SEPARATE NON-SALVAGEABLE MATERIALS FROM SALVAGED ITEMS. TRANSPORT AND DELIVER NON-SALVAGEABLE ITEMS TO LICENSED DISPOSAL FACILITY.

PROTECT STRUCTURAL COMPONENTS NOT REMOVED FOR DEMOLITION FROM MOVEMENT OR DAMAGE.

SUPPORT AFFECTED STRUCTURES. IF SAFETY OF BUILDING IS ENDANGERED, CEASE OPERATIONS AND IMMEDIATELY NOTIFY CONSULTANT.

PROTECT SURFACE DRAINAGE, MECHANICAL AND ELECTRICAL FROM DAMAGE AND BLOCKAGE.

SEPARATE AND STORE MATERIALS PRODUCED DURING DISMANTLING OF STRUCTURES IN DESIGNATED AREAS.

PREVENT CONTAMINATION OF MATERIALS TO BE SALVAGED AND RECYCLED AND HANDLE MATERIALS IN ACCORDANCE WITH REQUIREMENTS FOR ACCEPTANCE BY DESIGNATED FACILITIES.

ON-SITE SOURCE SEPARATION IS RECOMMENDED.

REMOVE COMINGLED MATERIALS TO OFF-SITE PROCESSING FACILITY FOR SEPARATION.

PROVIDE WAYBILLS FOR SEPARATED MATERIALS.

1.10 DISPOSAL OF WASTES

DO NOT BURY RUBBISH OR WASTE MATERIALS.

DO NOT DISPOSE OF WASTE, VOLATILE MATERIALS, MINERAL SPIRITS, OIL, AND PAINT THINNER INTO WATERWAYS, STORM, OR SANITARY SEWERS.

KEEP RECORDS OF CONSTRUCTION WASTE INCLUDING:

NUMBER AND SIZE OF BINS.

WASTE TYPE OF EACH BIN.

TOTAL TONNAGE GENERATED.

TONNAGE REUSED OR RECYCLED.

REUSED OR RECYCLED WASTE DESTINATION.

REMOVE MATERIALS FROM DECONSTRUCTION AS DECONSTRUCTION/DISASSEMBLY WORK PROGRESSES.

PREPARE PROJECT SUMMARY TO VERIFY DESTINATION AND QUANTITIES ON A MATERIAL-BY-MATERIAL BASIS AS IDENTIFIED IN PRE-DEMOLITION MATERIAL AUDIT.
1.11 USE OF SITE AND FACILITIES
  1. Execute work with least possible interference or disturbance to normal use of premises.
  2. Maintain security measures established by existing facility, and also provide temporary security measures approved by Consultant when required to assure continuity of security.

1.12 SCHEDULING
  1. Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

1.13 APPLICATION
  1. Do Work in compliance with WRW.
  2. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

1.14 CLEANING
  1. Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
  2. Clean-up work area as work progresses.
  3. Source separate materials to be reused/recycled into specified sort areas.

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Sample Schedules A, B and C Follow
## WASTE AUDIT (WA)

### Schedule A - Waste Audit (WA):

<table>
<thead>
<tr>
<th>Material Category</th>
<th>Material Quantity</th>
<th>Estimated Waste %</th>
<th>Total Quantity of Waste (unit)</th>
<th>Generation Point</th>
<th>% Recycled</th>
<th>% Reused</th>
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1.16 WASTE REDUCTION WORKPLAN (WRW)

.1 Schedule B:

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<thead>
<tr>
<th>Material Category</th>
<th>Person(s) Responsible</th>
<th>Total Quantity of Waste (unit)</th>
<th>Reused Amount (units) Projected</th>
<th>Actual</th>
<th>Recycled Amount (unit) Projected</th>
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### 1.17 DEMOLITION WASTE AUDIT (DWA)

#### Schedule C - Demolition Waste Audit (DWA):

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<th>Material Description</th>
<th>Quantity</th>
<th>Unit</th>
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<th>Weight (cum)</th>
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<td>WD Door Trim</td>
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<td>Doors and Windows</td>
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END OF SECTION
Part 1 General

1.1 RELATED SECTIONS

.1 Section 02 41 20 – Selective Interior Demolition.
.2 Section 07 84 00 – Firestopping.

1.1 REFERENCES

.1 CSA International (CSA)
   .2 CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

1.2 DEFINITIONS

.1 Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
.2 Patching: Fitting and repair work required to restore surfaces and substrates to original conditions after installation of other Work.

1.3 SUBMITTALS

.1 Cutting and Patching Proposal: Submit a proposal in accordance with Division 01 General Requirements, describing procedures at least 7 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
   .1 Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
   .2 Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
   .3 Products: List products to be used and firms or entities that will perform the Work.
   .4 Dates: Indicate when cutting and patching will be performed.
   .5 Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
   .6 Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure to the Consultant prior to making cuts or modifications.
   .7 Consultant's Acceptance: Obtain acceptance of cutting and patching proposal before cutting and patching. Review and acceptance of cutting and patching proposal does not waive right to later require removal and replacement of unsatisfactory work.
1.4 QUALITY ASSURANCE

.1 Comply with the requirements of Division 01 – General Requirements and Appendixes.

.1 Appendix 1: Baycrest Holidays and Special Days for 2016 and 2017.
.2 Appendix 2: Baycrest Method of Procedure.
.4 Appendix 4: Baycrest Infection Control Guidelines.


.3 Preparation shall comply with Section 02 41 20 – Selection Interior Demolition, article 3.1 PREPARATION.

.4 Work shall conform to CSA S350.

.5 Structural Elements: Do not cut and patch structural elements in a manner that could change their load carrying capacity or load deflection ratio.

.6 Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety, including the following:

.1 Primary operational systems and equipment.
.2 Air or smoke barriers.
.3 Fire protection systems.
.4 Control systems.
.5 Communication systems.
.6 Conveying systems.
.7 Electrical wiring systems.

.7 Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety, including the following:

.1 Water, moisture, or vapour barriers.
.2 Membranes and lashings.
.3 Exterior wall construction.
.4 Equipment supports.
.5 Piping, ductwork, vessels, and equipment.
.6 Noise and vibration control elements and systems.
.8 Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Consultant's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

.9 Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

.10 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

1.5 SITE CONDITIONS

.1 Should material resembling spray or trowel applied asbestos or other designated substance listed as hazardous as defined by the Hazardous Materials Act be encountered, stop work in area affected, take preventative measures, notify Consultant immediately, and await instructions. Proceed only after written instructions have been received from Consultant.

Part 2 Products

2.1 MATERIALS

.1 Repair Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. Repair materials shall match or exceed the physical properties and performance characteristics of existing. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

Part 3 Execution

3.1 EXAMINATION

.1 Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed:

.1 Perform non-destructive, non-ionizing radio frequency scanning or other approved scanning procedures to determine locations of services and reinforcing in concrete slabs and block walls before cutting and renovations. Advise Consultant of findings before proceeding with Work and revise penetration locations as required and directed by Consultant. Concrete slab thickness and construction is to be confirmed by Contractor prior to cutting or coring.
.2 Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
.3 Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 COORDINATION
.1 Coordinate with other trades as required.
.2 Coordinate work with requirements of Section 07 84 00 – Firestopping.

3.3 PREPARATION
.1 Temporary Support: Provide temporary support of Work to be cut in accordance with Division 01 General Requirements: Temporary Barriers and Enclosures.
.2 Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
.3 Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
.4 Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.4 PERFORMANCE
.1 General: employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay:
.1 Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
.2 Cutting: cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations:
.1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
.2 Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
.3 Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond core drill.
.4 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
.5 Proceed with patching after construction operations requiring cutting are complete.

.3 Patching: patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections:

.1 Inspection: where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

.3 Floors and Walls: where walls or partitions that are removed extend from one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.1 Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

.4 Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

.5 Ceilings: patch, repair, or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

.6 Exterior Building Enclosure: patch components in a manner that restores enclosure to a weather tight condition.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.1 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

1  Section 02 07 50 – Cutting and Patching.
2  Section 07 84 00 – Firestopping.
3  Section 08 11 13 – Metal Doors and Frames.
4  Section 09 21 16 – Gypsum Board Assemblies.
5  Section 09 22 00 – Non-Structural Metal Framing.
6  Section 09 91 23 – Interior Painting.

1.2  REFERENCES

1  American National Standards Institute (ANSI)

2  Canadian Federal Legislation

3  CSA International (CSA)
   2  CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

4  National Fire Protection Association (NFPA)
   1  NFPA (Fire) 241-13, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

5  U.S. Environmental Protection Agency (EPA)

1.3  COORDINATION

1  Coordinate and cooperate with other trades as required.

2  Refer to ‘KEYNOTES – DEMOLITION’ on demolition drawings.
1.4 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

.2 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.

.1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.

.3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos, lead-based paint, PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.

.4 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.

.1 Recycling does not include burning, incinerating, or thermally destroying waste.

.6 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from remodelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.7 Salvage: removal of structural and non-structural materials from deconstruction and disassembly work for purpose of reuse or recycling.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Demolition Meeting: Conduct a pre-demolition meeting at Project site 1 week prior to beginning work of this Section to:

.1 Verify project requirements.

.2 Verify existing site conditions adjacent to demolition work.

.3 Coordination with other construction trades.

.2 Hold project meetings every week.

.3 Ensure key personnel attend.

.4 Consultant will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.5 Scheduling:

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.2 In event of unforeseen delay notify Consultant in writing.
.6 Give notice to utility authorities having jurisdiction controlling services and appurtenances that will be affected by demolition Work.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Qualification Data: For firms and persons specified below to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses and other information specified.

.2 Shop Drawings:
   .1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.
   .2 Submit demolition drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

1.7 QUALITY ASSURANCE

.1 Comply with the requirements of Division 01 – General Requirements and Owner’s policies and procedures, including but not limited to the following.
   .1 Baycrest Holidays and Special Days for 2016 and 2017.
   .2 Baycrest Method of Procedure.
   .4 Baycrest Infection Control Guidelines.


.3 Work shall conform to CSA S350.

.4 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial and federal jurisdictions:
   .1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the authority having jurisdiction.
   .2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of authority having jurisdiction.
   .3 Collection and transport of hazardous materials, if required, shall comply with The Transportation of Dangerous Goods (TDG) Act.

.5 Demolition / Deconstruction Company Qualifications: An experienced firm that has documented successful experience in demolition and deconstruction work in hospitals, long-term care facilities, or nursing homes:
   .1 Conform to the Ontario Occupational Health and Safety Act and Regulations, as amended.
   .2 Conform to WCIB Regulations.
   .3 Conform to Regulatory Requirements.
1.8 SITE CONDITIONS

.1 Prevent extraneous materials from contaminating air beyond work areas by providing temporary enclosures during demolition work.

.2 Cover or wet down dry materials and waste being transported to prevent blowing dust and debris.

1.9 EXISTING CONDITIONS

.1 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous is encountered or is reasonable thought to be encountered in course of demolition, stop work, take preventative measures, and notify Consultant immediately. Proceed only after receipt of written instructions have been received.

.2 Structures to be demolished are based on their condition on date that tender is accepted.

.1 Remove, protect and store salvaged items as directed by Consultant.

.2 Salvage items as identified by Owner.

.3 Deliver to Owner as directed.

Part 2 Products

2.1 TEMPORARY SUPPORT STRUCTURES

.1 Design temporary support structures required for demolition work as necessary for the project using a qualified professional engineer registered or licensed in province of the Work if structural work is required or anticipated.

2.2 EQUIPMENT

.1 Use equipment suitable for work required, meeting current emissions standards.

.2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

2.3 HOARDING

.1 Gypsum Board: Standard Board, fire-rated as required, to Section 09 21 16 – Gypsum Board Assemblies.


.3 Steel Studs: to Section 09 22 00 – Non- Structural Metal Framing.

.4 Hollow metal doors and pressed steel frames: fire-rated as required, to Section 08 11 13 – Metal Doors and Frames.

.5 Temporary firestopping at rated partitions: provide temporary firestopping that can be removed without staining or damage to substrates upon dismantling and removal of temporary hoarding installations, to Section 07 84 00 – Firestopping.

.6 Painting: to Section 09 91 23 – Interior Painting.
3.1 **PREPARATION**

.1 Preparation Work shall be performed in accordance with Section 01 11 10 – General Requirements: item 1.1 WORK ZONE ISOLATION. Leave protection in place until Substantial Performance of the Contract, or as directed by Consultant if an earlier time is approved by Owner.

3.2 **DECONSTRUCTION AND DEMOLITION**

.1 Work shall meet or exceed the guidelines and recommendations found in CSA Z317.13.

.2 Drawings indicate extent of requirements for demolition, removals and salvage, and remove and store for reuse. Demolish or deconstruct parts of structures to remain as required to make way for new installations, and facilitate repairs, restoration work, and renovations.

.3 Use deconstruction processes and procedures to the extent practicable to maximize meeting waste diversion, salvage requirements, and minimize damage to interior finishes and structure.

.4 Do not damage heritage designated elements without prior approval of Consultant.

.5 Deconstruct carefully, do not damage materials or finishes, salvage for installation by other trades, clean and store securely on site as directed by Consultant.

.6 Blasting operations not permitted.

.7 Remove contaminated or dangerous materials as defined by authorities having jurisdiction from site and dispose of in safe manner to minimize danger at site, and during transportation and disposal. Comply with applicable laws and regulations.

.8 Prior to start of Work, remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of at designated disposal facilities in safe manner and in accordance with TDGA and other applicable requirements.

.9 At end of each day's work, leave Work in safe and stable condition.

.10 Demolish using procedures that minimize dusting; prevent migration of dust outside of work areas.

.11 Contain fibrous materials to minimize release of airborne fibres while being transported within facility.

.12 Remove and dispose of demolished materials in accordance with requirements of authorities having jurisdiction.

.13 Remove salvaged materials and equipment selected by Consultant, and store in location designated by Consultant.

.14 Use natural lighting to do Work where possible.

.15 Shut off lighting except those required for security and safety purposes at end of each day.
3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.1 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

.1  Section 08 11 13 – Metal Doors and Frames.
.2  Section 08 56 13 – Passthrough Windows
.3  Section 08 14 16 – Flush Wood Doors.
.4  Section 09 21 16 – Gypsum Board Assemblies.

1.2  REFERENCES

.1  ASTM International (ASTM)
   .1  ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   .2  ASTM F3125 / F3125M-15a, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2  CSA International (CSA)
   .1  CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).
   .2  CSA S16-14, Design of steel structures.
   .3  CSA W47.1-09(R2014), Certification of companies for fusion welding of steel.
   .4  CSA W48-14, Filler metals and allied materials for metal arc welding.
   .5  CSA W55.3-08(R2013), Certification of companies for resistance welding of steel and aluminum.
   .7  CSA W178.2-08 (R2013), Certification of Welding Inspectors.

.3  National Association of Architectural Metal Manufactures (NAAMM)

1.3  SUBMITTALS

.1  Provide required information in accordance with Division 01 General Requirements: Submittal Procedures.

.2  Submit manufacturer's printed product literature, specifications and data sheets.

.3  Submit Shop Drawings as follows:
   .1  Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
1.4 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Detail and fabricate metal fabrications in accordance with the NAAMM AMP 555.

.4 Accurately fit joints and intersecting members in true planes with adequate fastening. Build and erect Work plumb, true, square, straight, level, accurate to the sizes shown, and free from distortion or defects.

.5 Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.6 Welding: Qualify procedures and personnel according to the following:
   .1 Welders shall be qualified by Canadian Welding Bureau for classification of work being performed.
   .2 Fabricator shall be certified to CSA W47.1, Division 1 or 2.1.
   .3 Welding inspection to CSA W178.
   .4 Resistance welding: to CSA W55.3.
   .5 Fusion welding: to CSA W59.

1.5 FIRE WATCH

.1 Each time welding or other Hot Work is performed at site, Contractor shall institute Fire Watch procedures for minimum 1 hour after completion of Hot Work. Fire Watch requirements are specified in Section 01 11 10 – General Requirements.

.2 Provide, mount, identify, maintain and inspect all portable fire extinguishers as prescribed in the Regulations for Construction Projects and the Ontario Fire Code.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Exercise due care in storing, handling and erecting all materials and support all materials properly at all times so that no piece will be bent, twisted or otherwise damage structurally or visibly.

.2 Correct damaged material and where the Consultant deems damage irreparable, replace the affected items at no additional expense to the Consultant or Owner.

.3 Apply protective covering to face of all exposed finished metalwork before it leaves shop, covering to remain until item installed.

.4 Fabricate large assemblies so they can be safely and easily transported and handled to their place of installation.
1.7 **JOB CONDITIONS**

.1 Coordinate this Work with the remainder of the Work and exercise the necessary scheduling to ensure that all Work is carried out and all items incorporated during the appropriate construction phase.

.2 Provide instructions and drawings to other trades for setting bearing plates, anchors blots, and other members that are built in to work of other trades.

.3 Protect other Sections of the Work from damage by this Section of the Work.

**Part 2** Products

2.1 **MATERIALS**

.1 Steel sections and plates: to CAN/CSA G40.20/G40.21, Grade 350W.

.2 Hollow structural sections: to CAN/CSA G40.20/G40.21, Grade 350W, Class C.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Fasteners: Bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws, and machine bolts.

.1 Unfinished fasteners: In areas not exposed to public, use unfinished bolts conforming to ASTM A307, Grade A, with hexagon heads and nuts. Supply bolts of lengths required to suit the thickness of the material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.6 Structural bolts: to ASTM F3125 (ASTM F3125M for metric applications).

2.2 **FABRICATION**

.1 Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

.2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.3 Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

.1 Temperature change (Range): 100 deg F (38 deg C).

.4 Shear and punch metals cleanly and accurately. Remove burrs.
Ease exposed edges to a radius of approximately 0.794 mm (1/32 inch), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Remove sharp or rough areas on exposed traffic surfaces.

Weld corners and seams continuously to comply with American Welding Society (AWS) recommendations, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

Shop Assembly: preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

Cut, reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware, screws, and similar items.

Ensure exposed welds are continuous for length of each joint.

Grind or file exposed welds and steel sections smooth and flush with adjacent surfaces. Weld locations not to be visible after application of paint finishes.

Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

Accurately form connections with exposed faces flush; mitres and joints tight.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

All welding is to be performed by CWB Certified Welders.

Painting: preparation, primer and finish coats to Section 09 91 23 – Interior Painting.

ROUGH HARDWARE

Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.
2.4 MISCELLANEOUS FABRICATIONS

.1 Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated that are not a part of structural steel framework, as required to complete work.

.2 Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitred joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

.3 Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

.4 Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.

Part 3 Execution

3.1 ERECTION

.1 Install Work in accordance with manufacturer's or fabricator's (as applicable) written instructions, and Drawings.

.2 Do welding work in accordance with CSA W59 unless specified otherwise.

.3 Supply finished items to be built-in to those trades along with instructions for proper installation.

.4 Apply architectural metalwork using hidden mechanical fasteners. Installation shall be by skilled Architectural metalworkers experienced in highest quality work.

.5 Fasteners to draw adjoining sections together in proper, true alignment, and are capable of field adjustment.

.6 All fasteners, mountings to be non-loosening and installed so that they will be hidden at completion.

.7 Install all Work to true, straight lines, accurate to profile, all properly aligned.

.8 Isolate dissimilar metals in a manner approved by the Consultant to prevent electrolytic action or corrosion.

.9 Install finish hardware supplied under other Sections required for completion of components of this Section.

.10 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
.11 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.12 Make field connections with high tensile bolts to CSA S16 and weld to prevent loosening.

.13 Hand items over for building-in to appropriate trade(s), together with setting templates.

3.2 MISCELLANEOUS ITEMS

.1 Supply and install miscellaneous metal fabrications as indicated or specified, or as otherwise required in accordance with the design intent of the project.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS
   .1  Section 08 11 14 – Metal Doors and Frames.
   .2  Section 08 14 16 – Flush Wood Doors.
   .3  Section 09 21 16 – Gypsum Board Assemblies.

1.2  REFERENCES
   .1  American Society for Testing and Materials International (ASTM)
      .1  ASTM A307-12, Standard Specification for Carbon Steel Bolts, Studs, and
           Threaded Rod 60 000 PSI Tensile Strength.
      .2  ASTM C954-11, Standard Specification for Steel Drill Screws for the Application
           of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in.
           (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
      .3  ASTM F1667-11ae1, Standard Specification for Driven Fasteners: Nails, Spikes,
           and Staples
   .2  Canadian Standards Association (CSA International)
      .1  CSA O141-05 (R2014), Softwood Lumber.
   .3  National Lumber Grading Association (NLGA):
      .1  Standard Grading Rules for Canadian Lumber 2014.

1.3  SUBMITTALS
   .1  Provide required information in accordance with Division 01 General Requirements:
       Submittal Procedures
   .2  Datasheets: submit manufacturer’s printed product literature, specifications and data
       sheets.

1.4  QUALITY ASSURANCE
   .1  Lumber shall be graded and stamped by an agency certified by Canadian Lumber
       Standards Accreditation Board.

1.5  DELIVERY, STORAGE, AND HANDLING
   .1  Deliver wood products bundled or crated to provide adequate protection during transit.
       Inspect wood products for damage upon delivery and remove and replace damaged
       materials.
   .2  Store materials a minimum of 150 mm off the ground on blocking. Keep materials under
       cover and dry. Provide for air circulation within and around stacks and under temporary
       coverings.
   .3  Protect sheet materials to prevent breaking of corners and damage to surfaces.
Part 2  Products

2.1  MISCELLANEOUS LUMBER

.1  Provide lumber for support or attachment of other construction.

.2  Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on drawings.

.3  Moisture Content: 19% maximum for lumber items not specified to receive wood preservative treatment.

.4  Grade: provide S-P-F No. 2 or better grade lumber in accordance with NLGA standards.

2.2  ACCESSORIES

.1  Nails, spikes and staples: to ASTM F1667.

.2  Rough Hardware (bolts, nuts, washers, etc.): Grade A low carbon steel, conforming to ASTM A307.

.3  Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs recommended for purpose by manufacturer.

Part 3  Execution

3.1  INSTALLATION

.1  Install members true to line, levels and elevations, square and plumb.

.2  Construct continuous members from pieces of longest practical length.

.3  Install spanning members with crown-edge up.

.4  Install blocking as required to support installation of flush wood door hardware, passthrough windows, washroom accessories.

3.2  CLEANING

.1  Progress Cleaning: clean in accordance with Division 01 General Requirements.

.1.1  Leave Work area clean at end of each day.

.2  Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with.

.3  Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

.1.1  Remove recycling containers and bins from site and dispose of materials at appropriate facility.
3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION
Part 1  General

1.1  SUMMARY

.1 Install firestopping as required by Code in rated assemblies; refer to Drawing A0.05.

1.2  RELATED SECTIONS

.1 Section 02 41 20 – Selective Interior Demolition.
.2 Section 08 11 13 – Metal Doors and Frames.
.3 Section 08 56 13 – Passthrough Windows.
.4 Section 09 21 16 – Gypsum Board Assemblies.

1.3  REFERENCES

.1 ASTM International (ASTM)
   .1 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   .2 ASTM A1008/A1008M-16, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
   .5 ASTM E2174-14b, Standard Practice for On-Site Inspection of Installed Fire Stops.

.2 CSA International (CSA)
   .1 CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

.3 Firestop Contractors International Association (FCIA)
   .1 FCIA Firestop Manual of Practice (MOP).
   .2 FM 4991, Standard for the Approval of Firestop Contractors.

.4 International Firestop Council (IFC)
   .1 Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs).


.5 Underwriter's Laboratories of Canada (ULC)
  .2 CAN/ULC S101-14, Standard Methods of Fire Endurance Tests of Building
Construction and Materials.
  .3 CAN/ULC S102-10, Standard Method of Tests for Surface Burning
Characteristics of Building Materials and Assemblies.
  .4 CAN4 S114-05, Standard Method of Test for Determination of
Non-Combustibility in Building Materials.
  .5 CAN/ULC S115-11, Standard Method of Fire Tests of Fire Stop Systems.
  .6 CAN/ULC S702-14, Standard for Thermal Insulation Mineral Fibre for Buildings.
  .7 ULC S702.2-15, Mineral Fibre Thermal Insulation for Buildings, Part 2:
Application Guidelines.
  .8 ULC List of Equipment and Materials.

.6 Underwriters Laboratories Inc. (UL)

.7 National Fire Protection Agency (NFPA)
  .1 NFPA 251, Standard Methods of Tests of Fire Endurance of Building

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning
work of this Section, with contractor's representative and Consultant in accordance with
Division 01 General Requirements to:
  .1 Verify project requirements.
  .2 Review installation and substrate conditions.
  .3 Coordination with other building trades.
  .4 Review manufacturer's installation instructions, and warranty requirements.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Division 01 General Requirements.
  .1 Not later than 30 working days following Award of Contract, submit a schedule
and shop drawings, including room numbers from the Contract Drawings.
Indicate ULC assembly number for each condition, required temperature rise and
flame rating, hose stream rating, thickness, installation methods and materials of
firestopping and smoke seals, damming materials, reinforcements, anchorages and
fastenings, size of opening, adjacent materials and number of penetrations.
Include manufacturer’s printed instructions for each type of penetration.
  .2 Where possible determine thickness to be applied from tests of assemblies
identical to the assembly to be protected, conducted in accordance with
CAN/ULC S101.
.3 Engineering Judgements: where a UL / ULC / c-UL Design (assembly number) has not been issued, obtain an engineering judgement from the system manufacturer for a solution relevant to the job conditions involved, and obtain approval of the Authorities Having Jurisdiction.

.1 Determine system from available engineering studies, or correspondence with the labelling agency indicating the effect of the differences on the fire separation of the assembly. Confirm acceptance of system by Authorities Having Jurisdiction in writing.

.2 Obtain and submit fire stop system manufacturer’s engineering judgement(s) meeting the requirements of Authorities Having Jurisdiction.

.3 Engineering judgements shall comply with “Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs).”

.2 Submit product data in accordance with Division 01 General Requirements:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality assurance submittals: submit following in accordance with Division 01 General Requirements.

.1 Contractor shall obtain a training letter from the firestop system manufacturer, and submit it to Consultant prior to firestop installation.

.2 Submit copies of engineering judgments approved by local authorities having jurisdiction to Consultant prior to installation.

.3 The firestopping system manufacturer shall submit a letter of certification to the Contractor, certifying that all firestopping has been installed in compliance with the approved ULC design specifications for each type of penetration. Forward one copy to Consultant, and include one copy in operations and maintenance manual, to Division 01 General Requirements.

.1 The ‘Certificate of Substantial Performance’ shall not be issued until Consultant has received the manufacturer's letter of certification from the Contractor indicating that all fire-stopping applications comply with the tested assemblies of the manufacturer.

.4 Submit the manufacturer's engineering judgment identification number(s) and Shop Drawing details when no ULC or cUL system is available for an application. Engineering judgments must include the Contract name and number, and the Contractor’s name.

.5 For those firestop applications that exist, for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests shall be submitted to local Authorities Having Jurisdiction, with a copy to Consultant, for their review prior to installation. Engineering judgment Drawings must follow the requirements set forth by the IFC.
1.6 QUALITY ASSURANCE

.1 Qualifications:
   .1 Installer:
      .1 Company or person specializing in fire stopping installations, and approved by the manufacturer with minimum 5-years documented experience.
      .2 Company or person shall be a member in good standing of the Firestop Contractors International Association (FCIA).
   .2 Work of this Section shall comply with the FCIA Firestop Manual of Practice (MOP), the Ontario Building Code – 2012 (OBC), and the Ontario Fire Code – 2012 (OFC), including errata and amendments.
   .3 Use materials and methods of determining required thickness of application that have the full acceptance of Authority Having Jurisdiction.
   .4 Use materials tested to CAN/ULC S115. Assemblies containing the materials shall be in accordance with assemblies tested and approved by agencies acceptable to Authority Having Jurisdiction.
   .5 Single Source Responsibility:
      .1 Obtain through-penetration firestop and joint systems for each kind of penetration and construction condition indicated from a single source of manufacture and installation responsibility.
   .6 The manufacturer's direct technical representative (not distributor or agent) shall be on-site during the initial installation of the firestop systems to provide training to the installer’s personnel in the proper product selection and installation procedures.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling, and unloading:
   .1 Deliver, store and handle materials in accordance with Division 01 General Requirements: Common Product Requirements.
   .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
   .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC markings.

.2 Storage and Protection:
   .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
   .2 Replace defective or damaged materials with new.
   .3 Use stock before its expiration date.
1.8 PROJECT CONDITIONS

.1 Install firestopping and smokeseals materials only when the areas in which they are scheduled are closed-in and protected from dampness.

.2 Environmental Limitations: Install firestopping and smokeseals systems when ambient or substrate temperatures are within temperature and moisture limits permitted by firestopping and smokeseals system manufacturers or when substrates are not wet due to rain, frost, condensation, or other causes.

.3 Ventilate firestopping and smokeseals systems in accordance with manufacturer's written instructions by natural means or forced air circulation where natural means are not adequate.

Part 2 Products

2.1 PERFORMANCE/DESIGN CRITERIA

.1 Delegated Design Requirements: Design firestopping and smokeseals required by the Contract Documents to meet fire ratings indicated, and in accordance with requirements of the Ontario Building Code 2012 and Amendments.

.2 Performance Requirements: Manufacturer shall design proprietary assemblies to withstand the listed ratings in accordance with the Ontario Building Code 2012 and Amendments, Underwriters Laboratories Canada, and authorities having jurisdiction, and as follows:

.1 Provide through-penetration firestop and joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of assembly penetrated:

.1 Fire resistance rated load bearing walls, including partitions, with fire protection rated openings.

.2 Fire resistance rated non-load bearing walls, including partitions, with fire protection rated openings.

.3 Fire resistance rated floor assemblies.

.2 F-Rated Systems: Provide through penetration firestop systems with F-ratings indicated, as determined by ULC S115, but not less than that equalling or exceeding fire resistance rating of constructions penetrated.

.3 T-Rated Systems: For the following conditions, provide through penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per by ULC S115, where systems protect penetrating items exposed to potential contact with adjacent materials:

.1 Penetrations located outside wall cavities.

.2 Penetrations located outside fire resistive shaft enclosures.

.3 Penetrations located in construction containing fire protection rated openings.
.4 Penetrating items larger than 100 mm diameter nominal pipe or 100 cm² in overall cross sectional area.

.4 Firestopping and Smokeseals Systems Exposed To View: Systems exposed to view, traffic, moisture, and physical damage; provide products that after curing do not deteriorate when exposed to these conditions both during and after construction, and as follows:

.1 Provide moisture resistant through penetration firestop systems for piping penetrations for plumbing and wet pipe sprinkler systems.

.2 Provide firestopping and smokeseals systems capable of supporting floor loads involved either by installing floor plates or by other means for floor penetrations with annular spaces exceeding 100 mm in width and exposed to possible loading and traffic.

.3 Provide firestopping and smokeseals systems not requiring removal of insulation for penetrations involving insulated piping.

.4 Provide products with flame spread ratings of less than 25 and smoke developed ratings of less than 50 for firestopping and smokeseals and joint systems exposed to view.

.5 Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equalling or exceeding fire resistance rating of constructions in which joints are located.

2.2 FIRESTOPPING AND SMOKESEALS: GENERAL

.1 Compatibility: Provide firestopping and smokeseals systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping and smokeseals systems, under conditions of service and application, as demonstrated by firestopping and smokeseals system manufacturer based on testing and field experience, and as follows:

.1 Service penetration assemblies: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.

.2 Service penetration firestopping and smokeseals components: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.13, under the Label Service of ULC.

.3 Fire resistance rating of installed firestopping and smokeseals assembly not less than the fire resistance rating of surrounding floor and wall assembly.

.4 Firestopping and Smokeseals at openings intended for ease of re-entry such as cables: elastomeric seal; do not use cementitious or rigid seal at such locations.

.5 Firestopping and Smokeseals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations. Exemption to fire dampers.
.2 Accessories: Provide components for each firestopping and smokeseals systems that are needed to install fill materials. Use only components specified by firestopping and smokeseals system manufacturer and approved by the qualified testing and inspecting agency for firestopping and smokeseals systems indicated. Accessories include, but are not limited to, the following items:

.1 Permanent forming, damming and backing materials, including the following:
   .1 Slag or rock wool fibre insulation.
   .2 Sealants used in combination with other forming, damming or backing materials to prevent leakage of fill materials in liquid state.
   .3 Fire-rated form board.
   .4 Fillers for sealants.

.2 Temporary forming materials.

.3 Substrate primers.

.4 Collars.

.5 Steel sleeves.

.6 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.7 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.8 Metal fire stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m², minimum metal core thickness 0.912 mm.

.9 Steel Deck Moulded Flute Inserts: One piece moulded mineral fibre flute inserts, sized for steel deck profiles, for placement at top of fire rated wall assemblies:
   .1 Acceptable material: Hilti CP777 Speed Plugs.

.10 Labels: Peel-and-stick labels printed with the following information:
   .1 ATTENTION: FIRE RATED ASSEMBLY. DO NOT MODIFY
   .2 Name of firestopping manufacturer
   .3 Names of products used
   .4 Hour Rating of Assembly
   .5 Manufacturers standard detail number, or Engineered Judgement identifier; ULC or cULus Number
   .6 Date of installation
   .7 Name of installing Trade Contractor
   .8 Contact telephone number for repair or replacement of firestopping materials.
2.3 FILL MATERIALS

.1 General:

.1 Provide firestopping and smokeseals systems containing the types of fill materials indicated in the Firestopping and Smokeseals System Schedule below by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

.2 Firestopping and smoke seal systems shall be tested in accordance with ULC S115, and be comprised of asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases, and not to exceed opening sizes for which they are intended for the ratings as indicated on drawings.

.2 Cast-in-Place Firestopping and Smokeseals Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

.3 Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

.4 Firestopping and Smokeseals Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrating item.

.5 Cable Penetration Devices: Premanufactured intumescent blocks, consisting of a system of inserts and adjustable cores; or premanufactured fire rated cable pathway systems, the following products are acceptable:

.1 EZ-Path Fire Rated Pathway, Specified Technologies Inc.
.2 CP 653 Speed Sleeve, Hilti

.6 Intumescent Composite Sheets: Rigid panels consisting of aluminum foil faced elastomeric sheet bonded to galvanized steel sheet.

.7 Intumescent Putties: Non-hardening dielectric, water resistant putties containing no solvents, inorganic fibres, or silicone compounds.

.8 Intumescent Spray Foam: Expanding spray-in-place intumescent foam sealant.

.9 Intumescent Wrap Strips: Single component intumescent elastomeric sheets with aluminum foil on one side.

.10 Mortars: Pre-packaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

.11 Silicone Foams: Multi-component, silicone based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
Silicone Sealants: Moisture curing, single component, silicone based, neutral curing elastomeric sealants of grade indicated below:

.1 Grade for Horizontal Surfaces: Pourable (self-levelling) formulation for openings in floors and other horizontal surfaces.

.2 Grade for Vertical Surfaces: non-sag formulation for openings in vertical and other surfaces.

2.4 ACCESSORIES

.1 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.2 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.3 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.4 Metal fire stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m², minimum metal core thickness 0.95 mm (20 ga.).

2.5 MIXING

.1 For those products requiring mixing before application, comply with firestopping and smokeseals system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

.1 Examine surfaces, components, materials to receive firestopping and smokeseals material; report any conditions that would detrimentally affect the application of the material or the proper firestopping and smokeseals of the system.

.2 Commence Work when conditions of surfaces and the working conditions are suitable.

.3 Where penetration sealants or caulking are required, ensure all service lines are in place, tested and approved.
.4 Verify all proper blocking, framing (using non-combustible materials) are properly installed and prepared to receive firestopping and smokeseals. Notify Consultant in writing of any deficiencies affecting the proper performance of the firestopping and smokeseals, do not proceed until deficiencies are corrected.

3.3 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 without interruption to vapour barrier.

.4 Prime surfaces as required.

.5 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.4 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Apply firestopping and smokeseals materials/systems to maintain the fire separations in the project as indicated on drawings.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.5 Tool or trowel exposed surfaces to neat finish.

.6 Remove excess compound promptly as work progresses and upon completion.

3.5 SPECIAL REQUIREMENTS

.1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:

.1 Designed for re-entry, removable at: electrical and communications cable penetrations through partitions.

.1 Use Prefabricated Firestop Sleeves or prefabricated Cable Pathways, as approved by Consultant.
3.6 SEQUENCE OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install floor fire stopping before interior partition erections.

.3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

.4 Mechanical pipe insulation: certified fire stop system component.
   .1 Ensure pipe insulation installation precedes fire stopping.

3.7 FIELD QUALITY CONTROL

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
   .1 Cut tests may be made at random by the Consultant. Frequency of cut tests shall be determined by the Consultant, but will not be more than 1% of total length of firestopping and smokeseals.
   .2 Make all necessary repairs and correct all deficiencies noted after completion of cut tests.

.2 Manufacturer's Field Services:
   .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
   .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
   .3 Schedule site visits, to review Work, twice during progress of Work at 25% and 60% complete.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Government of Canada, Province of Ontario and City of Toronto regulations, by-laws and ordinances that address any aspect of the Work of this Section.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.
3.10  SCHEDULE

.1  Fire stop and smoke seal at:
   .1  Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
   .2  Edge of floor slabs at curtain wall and precast concrete panels.
   .3  Top of fire-resistance rated masonry and gypsum board partitions.
   .4  Intersection of fire-resistance rated masonry and gypsum board partitions.
   .5  Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
   .6  Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
   .7  Openings and sleeves installed for future use through fire separations.
   .8  Around mechanical and electrical assemblies penetrating fire separations.
   .9  Rigid ducts: greater than 129 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 fire separation.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

  .1  Section 08 11 13 – Metal Doors and Frames.
  .2  Section 08 56 13 – Passthrough Windows.
  .3  Section 09 21 16 – Gypsum Board Assemblies.

1.2  REFERENCES

  .1  ASTM International (ASTM)

  .2  ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.

  .1  CSA International (CSA)

  .1  CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

  .2  South Coast Air Quality Management District (SCAQMD), California State

  .1  SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3  ACTION AND INFORMATIONAL SUBMITTALS

  .1  Submittals shall comply Division 01 – General Requirements.

  .2  Submit manufacturer’s product data as follows:

  .1  Printed product literature describing type, composition recommendations, and directions for surface preparation, material preparation, and material installation.

  .3  Submit manufacturer’s installation instructions for each product used.

  .1  Before performing work of this Section, submit the names of proposed materials.

  .2  When required by Consultant, submit test certificates from an approved Canadian materials testing laboratory indicating that sealants meet the requirements specified, and that the tests have been conducted in accordance with ASTM D2240.

  .4  Submit samples for initial selection and quality assurance as follows:

  .1  Samples of back-up material, primer, joint fillers, and of each type and colour of sealant to be used. Cure samples under conditions anticipated at the site during application.
.5 Reports: submit written pre-installation meeting recommendations, field inspection, and test report results after each inspection.

.6 Submit Warranty.

1.4 QUALITY ASSURANCE

.1 Comply with the requirements of Division 01 – General Requirements and Appendixes.

.1 Appendix 1: Baycrest Holidays and Special Days for 2016 and 2017.
.2 Appendix 2: Baycrest Method of Procedure.
.4 Appendix 4: Baycrest Infection Control Guidelines.


.3 Preparation shall comply with Section 02 41 20 – Selection Interior Demolition, article 3.1 PREPARATION.

.4 Work shall conform to or exceed ASTM C1193 guidelines.

.5 Pre-Installation Meeting:

.1 Arrange with manufacturer's representative to inspect substrates and to review installation procedures 48-hours in advance of installation.
.1 Review conditions under which work will be done.
.2 Joint condition and profile.
.3 Weather conditions.

.2 Submit written report of meeting to Consultant.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with manufacturer’s recommendations and instructions.

.2 Deliver containers labelled and sealed, complete with written application and maintenance instructions.

.3 Store materials in a dry, heated enclosure.

1.6 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:
.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
.3 Joint-Substrate Conditions:
   .1 Do not proceed with installation of joint sealants until contaminants capable of
       interfering with adhesion are removed from joint substrates.
   .2 Substrate must be clean, dry, and frost free.

1.7 WARRANTY
   .1 Contractor warrants that sealant work will not leak, crack, crumble, melt, shrink, run, lose
       adhesion or stain adjacent surfaces for not less than two years from the date of
       Substantial Performance.

Part 2 Products

2.1 ACCEPTABLE MATERIALS CRITERIA
   .1 Other manufacturers and products may be acceptable provided submission of technical
       datasheets and product literature clearly demonstrates that the proposed alternate product
       has the same or better physical properties, performance characteristics, and warranty. The
       Acceptable Materials listings establish the functionality and minimum level of quality
       acceptable.

   .1 Alternates must be provided 7 working days prior to tender close. No alternates or
       substitutions will be considered beyond this deadline.

2.2 SEALANT MATERIALS
   .1 Type S-1: Mildew-Resistant Sealant: to ASTM C920 and GSB 19-GP-22M; meets one or
       more of the following approvals / specifications: fungi resistant to ASTM G21, FDA
       Regulation No. 21 CFR 177.2600, National Sanitation Foundation Standard 51, Federal
       Specifications TT-S-001543A and TT-S-00230C, USDA acceptance for use in meat and
       poultry processing plants; one-component, mildew-resistant, non-sag, silicone sealant.

       .1 Acceptable Materials:
           .1 Dow Corning 786.
           .2 Pecora 898 NST.

   .2 Type S-2: Silicone Sealant; to CAN/CGSB 19.13-M87, ASTM C1248, and ASTM C920:
       Type S Grade NS Class 50 use NT, M, G, A, O; medium-modulus, single-component,
       high-performance, neutral-cure silicone sealant; may be used as a joint sealant on
       substrates such as aluminum, glass, steel, painted metal, plastic, stone, concrete and
       brick.

       .1 Acceptable Materials:
           .1 864NST or 895NST, Pecora Corporation.
           .2 Dow Corning 795, Dow Corning
           .3 Spectrum 2, Tremco Sealant & Waterproofing
.3 Type S-3: Paintable one-component polyurethane sealant; silane end-capped, non-sag, moisture-cure for general construction, low-VOC, to ASTM C920 type S grade NS class 35 or class 25 use NT, M, A, O. Meets ASTM C1248, meets CAN/CGSB 19.13-M87, meets U.S. Federal Specification TT-S-00230C Class A, Type II.

Acceptable Materials:
.1 Dymonic FC, Tremco Inc.
.2 3M™ Polyurethane Sealant 540.
.3 Sikaflex® 15 LM.

.4 Type S-4: Horizontal joint sealant; two-component, self-levelling.

Acceptable Materials:
.1 To ASTM C920: type M; grade P; class 25; use T, M, O.
.2 Sikaflex 2c SL, Sika.
.3 Sonolastic SL 2, BASF Sonneborn.
.4 THC-901, Tremco Inc.
.5 Urexpan NR-200, Pecora.

.5 Type S-5: One-part moisture curing, low modulus polyurethane sealant for sealing joints in level and slightly slope surfaces conforming to ASTM C920, type S, grade P, class 50, use T, M, A, O.

Acceptable Materials:
.1 Sonolastic SL 1, BASF Sonneborn.
.2 Vulkem 45 SSL, Tremco Inc.
.3 Urexpan NR-201b, Pecora.

.6 Type S-6: Control joint sealant: two-component, epoxy-urethane, self-levelling, load bearing saw cut or preformed control joints.

Acceptable Materials:
.1 Loadflex, Sika.
.2 Dynapoxy EP-800, Pecora.
.3 MasterSeal CR 190, BASF Building Systems

.7 Type S-7: Canadian Food Inspection Agency accepted; two-component, gun-grade, slump-resistant elastomeric polyurethane sealant, specially formulated for sealing joints in water-immersion conditions, and highly resistant to biodegradation by both aerobic and anaerobic bacteria; to ASTM C920, Type M, Grade NS, Class 25, use T, NT, M, G, A, O; certified to CAN/ULC S115.

Acceptable Materials:
.1 Sikaflex 2c NS EZ Mix, by Sika Canada.
.2 Sikaflex 2c NS EZ Mix TG, by Sika Canada (traffic grade option).
2.3 ACCESSORIES

.1 Preformed compressible and non-compressible back-up materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are approved for applications indicated by sealant manufacturer based on site experience and laboratory testing.

.1 Rod Type Sealant Backings:

.1 ASTM C1330, Type C (closed cell material with a surface skin), Type O (open cell material) or Type B (bi-cellular material with a surface skin).

.2 Use any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated.

.3 Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

.4 Non-adhering to sealant, to maintain two-sided adhesion across joint.

.2 High Density Foam.

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m$^3$ density, or neoprene foam backer, size as recommended by manufacturer.

.3 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

.2 Primer: Non-staining type as recommended by sealant manufacturer.

.3 Joint Cleaner: Non-corrosive solvent type recommended by sealant manufacturer for applicable substrate materials.

2.4 COLOURS

.1 Colours:

.1 Sealants at masonry control joints to match mortar colour.

.2 Sealants at other locations to match colour of adjacent exposed material.

2.5 SEALANT SELECTION

.1 General:

.1 Where no specified type of sealant is shown or specified, choose one of the sealants specified in this Section appropriate for its location and conditions as recommended by the sealant manufacturer in accordance with its warranty provisions and technical product datasheet.

.2 Make sealant selections consistent with manufacturer’s printed guidelines.

.3 Always clean and prime bonding surfaces prior to applying sealants.
.2 Type S-1: Mould and mildew resistant, interior sealing applications exposed to high moisture; designed to seal nonporous surfaces around showers, tubs, sinks and plumbing fixtures where conditions of high humidity and temperature extremes exist; sealing around shower-tub enclosures, tubs, sinks, urinals and whirlpools; sealing around bathroom fixtures; Waterproofing rimless sinks.

.3 Type S-2: Use for metal-to-metal joints where no other specific sealant type is specified.

.4 Type S-3: Paintable, use one-component polyurethane general construction sealant at joints other than metal-to-metal where no other specific sealant type specified, or where its paintable properties are required.

.5 Type S-4: Use multi-component sealant for horizontal joint sealant of plaza, floors and decks, exterior areas only, subject to pedestrian and vehicular traffic.

.6 Type S-5: Use one-part sealant for horizontal joint sealant of plaza, floors and decks, exterior areas only, not subject to pedestrian and vehicular traffic.

.7 Type S-6: Use control joint sealant as filler for interior, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.

.8 Type S-7: Use at floor-to-wall joints exposed to frequent floor washing and other joints exposed to frequent wetting in kitchens, serveries, concessions, beverage storage; use as a wet area sealant for horizontal and vertical joints, and perimeter joints, at showers, exterior door threshold plates, and other wet area applications. Use traffic grade (TG) at horizontal floor locations.

Part 3 Execution

3.1 PROTECTION

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

3.2 EXAMINATION

.1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work means acceptance of existing conditions.

.2 Ensure joints are suitable to accept and receive the sealants.

.3 Ensure surfaces are sound, dry, and free from dirt, water, frost, loose scale, corrosion, bitumen, paints, and other contaminants that may adversely affect the performance of the sealing materials.

.4 Do not apply sealant to masonry until mortar has cured.

.5 Before any sealing work is commenced, test the materials for indications of staining or poor adhesion.

.6 Ensure joints and spaces which are to receive sealants are less than 10 mm deep; not less than 6 mm wide; and not more than 19 mm wide.
3.3 SURFACE PREPARATION

.1 Perform cleaning to the extent required to achieve acceptable joint surfaces, and as approved by sealant manufacturer.

.2 Protect adjacent finishes from damage.

.3 Cleaning Procedures:
   .1 Metal:
      .1 Blast cleaning: Sandblast or iron shot blast surfaces requiring heavy cleaning down to bright metal. Remove loose matter by compressed air or commercial vacuum cleaner.
      .2 Power tool cleaning: Clean surfaces by wire brush, impact tools, abrasive wheels or by buffing. Remove loose matter by compressed air or vacuum cleaner.
      .3 Solvent cleaning: Clean with solvent applied by spray or brush. Wipe with clean, dry wiping cloths. Remove paints with paint remover and wipe with solvent. Remove residue.
   .2 Concrete, Marble, Stone, Brick:
      .1 Remove friable material with wire brush or by chipping, until surfaces are sound. Remove surface residue with a stiff brush, vacuum cleaner or compressed air.
      .2 Concrete surfaces shall be cured for at least 28 days. Acid etch joint surfaces to remove alkaline salts and neutralize acid with a solution of tri sodium phosphate, followed by rinsing with clean, cold water.
      .3 Allow joints to dry thoroughly.
      .4 Completely remove resinous products used, such as curing compounds and form release agents.
   .3 Glass, Ceramics, and Porcelain: Brush with solvent and wipe with clean, dry wiping cloths. Remove residue.
   .4 Wood: Remove foreign matter such as soil, paint, grease, bitumen, resin with solvents, abrasives and paint removers; remove residue. Provide surfaces that are clean and dry.

.4 Do not exceed shelf life and pot life of the materials, and installation times, as stated by the manufacturers.

.5 Be familiar with the work life of the sealant to be used. Do not mix multiple component materials until required for use.

.6 Thoroughly mix multiple component sealants, and bulk sealants when recommended by manufacturer, using a mechanical mixer capable of mixing at 80-100 rpm without mixing air into the material. Continue mixing until the material is a uniform colour and free from streaks of unmixed material.

.7 Mask areas adjacent to joints to be sealed. Prevent contamination of adjacent surfaces. Remove masking promptly after the joint sealing has been completed.
3.4 INSTALLATION

.1 Install materials in compliance with the recommendations of their manufacturer.

.2 Fill joints with joint backing to produce joint profile with optimum sealant cross section. Provide joint depth of one half the joint width.

.3 Prime joints to receive sealants as recommended by the sealant manufacturer to prevent staining, to assist the bond and to stabilize pouring surfaces.

.4 Apply primer with a brush that will permit joint surfaces to be primed. Perform priming immediately before installation of sealants, allowing minimal time between priming and sealing as recommended by the sealant manufacturer.

.5 Sealants generally shall be of gun grade or knife grade non-sag consistency to suit the joint condition. Use gun nozzles of the proper sizes to suit the joints and the sealant material. Sealants for horizontal joints (other than overhead joints) shall be self-levelling type.

.6 Install sealant with pressure operated guns.

.7 Use sufficient pressure to fill all voids and joints solid. Sealant shall bond to the sides of the joint only and shall not adhere to the joint backing material. Provide bond breaker material where necessary.

.8 Pour or gun self-levelling, low viscosity grades of sealant into horizontal joints. If applied by gun, hold the nozzle to the bottom of the joints to ensure complete filling of the joints.

.9 Ensure that the correct sealant depth is maintained. Superficial coating with a skin bead will not be accepted.

.10 Except as otherwise specified, sealant installations shall be a full bead free from air pockets and embedded impurities, providing smooth surfaces, free from ridges, wrinkles, sags, air pockets and imbedded impurities.

.11 After joints have been completely filled, tool them neatly to a slightly concave surface.

.12 Tool sealants to achieve airtight joints. Use wet tools as required.

.13 Insert plastic vent tubes where required or shown, extending from the cavity to exterior face, sloped to the exterior. Seal around the tube and tool for positive adhesion. Insert joint backing for remainder of the joint. Do not plug vent tube during sealing operation.

3.5 REPAIR

.1 Cut out damaged sealant, repeat preparation, prime joints, and install new material as specified, and acceptable to the manufacturer.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements.

.1 Leave Work area clean at end of each day.

.2 Immediately clean adjacent surfaces that have been soiled and leave work in a neat, clean condition. Remove excess materials and droppings using recommended cleaners and solvents.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements.

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.8 SCHEDULE

.1 Interior: provide sealant at the following interior locations, unless joints are covered by trim or unless sealant is specified to be included in the work of other sections:

.1 Control joints and expansion joints in non-fire-rated masonry and gypsum board walls;

.2 Door frames and adjacent materials;

.3 Penetrations in non-fire-rated masonry and gypsum board walls;

.4 Top of non-fire-rated masonry and gypsum board walls;

.5 Vanities, counters, splash backs, lavatories, water closets, and urinals to adjacent wall and floor surface.

.6 Interior sealing shall include both sides of walls and frames where finished installation will be visible.

.7 Floor joints and joints at wall-to-floor transitions.

.8 Other joint locations to be sealed to prevent air, moisture or water penetration or infiltration, or the development of mould-susceptible environments.

.2 Joint designation in the preceding paragraphs, and the fact that the Drawings do not show all locations to be sealed, does not limit requirements to seal all locations necessary to create and ensure a continuous air-sealed and water-tight enclosure.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

.1 Section 07 84 00 – Firestopping.
.2 Section 08 81 00 – Glazing.
.3 Section 09 21 16 – Gypsum Board Assemblies.
.4 Section 09 91 23 – Interior Painting.
.5 Door Schedule, Door Hardware Sets.

1.2  REFERENCES

.1 American National Standards Organization (ANSI) / Steel Door Institute (SDI)
   .1 ANSI/SDI A250.3-2007 (R2011), Test Procedure and Acceptance Criteria for
       Factory Applied Finish Coatings for Steel Doors and Frames.
   .2 ANSI/SDI A250.8-2003 (R2008), Recommended Specifications for Standard
       Steel Doors and Frames.
   .3 ANSI/SDI A250.10-1998 (R2011), Test Procedure and Acceptance Criteria for
       Prime Painted Steel Surfaces for Steel Doors and Frames.

.2 American Society for Testing and Materials International (ASTM)
   .1 ASTM A653/A653M-15e1, Specification for Steel Sheet, Zinc-Coated
       (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   .2 ASTM A924 / A924M-16ae1, Standard Specification for General Requirements
       for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
   .3 ASTM B29-14, Standard Specification for Refined Lead.
   .4 ASTM B749-14, Standard Specification for Lead and Lead Alloy Strip, Sheet,
       and Plate Products.
   .5 ASTM D4726-15, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC)
       Exterior-Profile Extrusions Used for Assembled Windows and Doors.

.3 CSA International (CSA)
   .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded
       Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).
   .2 CSA W47.1-09(R2014), Certification of companies for fusion welding of steel.
   .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding), Includes Update
   .4 CSA Z317.13-12, Infection Control During Construction, Renovation, and
       Maintenance of Health Care Facilities.

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
   .1 CSDMA, Guide Specification for Installation and Storage of Hollow Metal Doors
       and Frames, 2012.
   .2 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames,
       2006.
1.3 X-RAY RADIATION SHIELDING CRITERIA

Work shall comply meet or exceed the requirements of the following as they apply to project conditions:

.2 Operatories:
   .1 X-Ray Protection Criteria: peak voltages in Operatories not to exceed 75 kV.
       Minimum lead sheet thickness: 1 mm thick (12.2 kg/m²) 99.99% pure commercial
       sheet lead, to ASTM B29.

.3 PAN Room:
   .1 X-Ray Protection Criteria: peak voltages in PAN Room not to exceed 150 kV.
       Minimum lead sheet thickness: 2.0 mm thick (24.4 kg/m²) 99.99% pure
       commercial sheet lead, to ASTM B29.

1.4 ACTION AND INFORMATIONAL SUBMITTALS
   .1 Submit in accordance with Division 01 – General Requirements.
   .2 Product Data:
       .1 Submit manufacturer’s printed product literature, specifications and data sheets
           for each type of door and frame specified.
   .3 Shop Drawings:
       .1 Indicate general construction of each type of door and frame, configurations,
           material, material thickness, jointing methods, mortises, reinforcements, anchors,
           arrangement of hardware, fire ratings, finish and special features.
       .2 Reference door and frame types to Door Schedule and Door Hardware Sets on
           Drawings. Indicate door numbers where applicable.
   .4 Lead Lined Door Submittals:
       .1 Submit evidence that fabricator / manufacturer has requisite experience.
       .2 Submit proof of specified insurance coverage.

1.5 QUALITY ASSURANCE
   .1 Manufacturer/Fabricator: member in good standing of the Canadian Steel Door and
       Frame Manufacturer’s Association.
   .2 Installer: Use installers who are experienced with the installation of hollow metal doors
       and frames of similar complexity and extent to that required for the Project.
   .3 Lead Lined Doors: fabricator / manufacturer shall be experienced in, equipped for and
       insured for fabrication equal to standards specified herein. The fabricator shall furnish
       evidence of manufacturer having not less than 10-years experience in successful
       fabrication of radiation protection materials similar to products specified herein.
       .1 Fabricator shall furnish proof of insurance certifying Fabricator is specifically
           insured in the fabrication of X-Ray Protection / Radiation Shielding Materials.
       .2 Single source responsibility: lead lined doors and frames shall be provided by the
           same fabricator / manufacturer for the whole Contract.
.4 Provide fire labelled frame products for those openings requiring fire protection ratings:
   .1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
   .2 Fabricate all rated doors and frames to labelling authority standard.

.5 Manufacture door and frame assemblies to ANSI/SDI A250.8.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Division 01 – General Requirements, and as follows:
   .1 Receive and store materials as recommended by materials manufacturer.
   .2 Adequately protect surfaces from damage during moving, handling and storage.

Part 2 Products

2.1 PERFORMANCE AND DESIGN CRITERIA

.1 Perform work in accordance with CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, except as otherwise specified herein.

.2 Steel fire rated doors and frames: Label and list fire rated doors and frames by an organization accredited by the Standards Council of Canada in conformance with CAN/ULC S104 and CAN/ULC S105 for ratings specified or indicated. Fire labels must be factory applied by the manufacturer.

.3 Be responsible for securing approval from Authorities Having Jurisdiction for materials, fabrication and installation of fire rated oversized door and frame assemblies

2.2 MATERIALS

.1 Steel:
   .1 Doors and frames: coated steel sheets to ASTM A924/M924; coating designation to ASTM A653/A653M: Commercial Steel (CS), Type B, ZF180 galvannealed; stretcher levelled.

.2 Nominal Base Metal Thickness Requirements:
   .1 Frames: refer to frame fabrication requirements specified in this section.
   .2 Doors: refer to door fabrication requirements specified in this section.
   .3 Hardware Reinforcement for Doors and Frames: Carbon steel, welded in place, prime painted, to the following minimum nominal thicknesses:
<table>
<thead>
<tr>
<th>Hardware Reinforcement</th>
<th>Door (mm)</th>
<th>Frame (mm)</th>
</tr>
</thead>
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<tr>
<td>Pivot Hinge:</td>
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<tr>
<td>Mortise Hinge:</td>
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<td>3.51</td>
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<tr>
<td>Mortise or Bored Lock or Deadbolt:</td>
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<td>Flush or Surface Bolt Front:</td>
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<td>Surface or Concealed Closer:</td>
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<td>Strike Reinforcements:</td>
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<td>Hold Open Arm:</td>
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<td>Electronic Hardware Reinforcements:</td>
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<td>Pull Plates and Bars:</td>
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<tr>
<td>Frame surface hardware reinfreacemnts:</td>
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</tbody>
</table>

.3 Door Core Materials

.1 Honeycomb: Structural small cell 25 mm maximum, kraft paper honeycomb:
.1 Weight: 36.3 kg/ream minimum.
.2 Density: 16.5 kg/m³ minimum.
.3 Sanded to required thickness.

.2 Polystyrene: Rigid extruded, closed cell insulation, fire retardant treated meeting the requirements of ULC S701, Type 4, minimum thermal resistance RSI 0.8/25 mm thickness.

.3 Temperature Rise Rated (TRR): Core composition shall provide the fire-protection rating and limit the temperature rise on the unexposed side of door at 250°C for 30 or 60 minutes as determined by Ontario Building Code 2012 and Amendments. Core shall be tested as part of a complete door assembly in accordance with CAN/ULC S104 covering the Standard Method of Tests of Door Assemblies and shall be listed by a nationally recognized testing agency having a factory inspection service.

2.3 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polystyrene cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Interlocking Edge Seam Adhesive: fire-resistant, resin-reinforced polychloroprene, high-viscosity, sealant/adhesive.

2.4 ACCESSORIES

.1 Door silencers (bumpers): Black neoprene, to ANSI/BHMA A156.16 Type 6-180; three silencers on strike jambs of single door frames; two silencers on heads of double door frames; screw fastener applied. Stick on bumpers are not acceptable.

.2 Interior top caps: rigid polyvinylchloride extrusion, to ASTM D4726.
.3 Fabricate glazing stops as formed channel, minimum 19 mm height, accurately fitted, butted at corners, and fastened to frame sections with counter-sunk oval head sheet metal screws.

.4 Make provisions for glazing as indicated and provide necessary glazing stops.
   .1 Provide removable glazing beads.

.5 Metallic paste filler: to manufacturer's standard.

.6 Fasteners: type 304 stainless steel screws with countersunk flat head.

.7 Labels for fire doors and door frame: brass plate, riveted to door and door frame.

.8 Sealant: Section 07 92 00 – Joint Sealants.

2.5 DOOR HARDWARE

.1 Door hardware: refer to Door Schedule, Door Hardware Sets.

.2 Provide construction cores.

.3 Lead Lined hardware or door sweeps to be installed where required to provide continuous radiation protection.

2.6 FABRICATION GENERAL

.1 Welded construction: assemble units by welding in accordance with CSA W59 to produce a finished unit square, true, and free of distortion. Welding shall be continuous unless specified otherwise. Welding shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1.

.2 Permit access by an approved inspection and testing company for the purpose of inspecting at random, doors being fabricated for this project.

.3 Make provisions in doors and frames to suit requirements of trade or section providing electrically operated hardware or security devices. Provide removable plates or knock outs for electrical contacts. Provide junction boxes on security door frames as required for door strikes, mag locks and door contacts. Ensure frames arrive on site prepared for wiring.

.4 Fabricate galvanized steel channels to reinforce frames as required for size, and for fire protection rating requirements. Extend reinforcements from floor to structure above. Design top connection to accommodate structural deflection. Conceal reinforcements in frames.

2.7 FRAME FABRICATION: GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Accurately form frames to profiles indicated. Construct frames straight and free from twist or warp.

.3 Interior frames: 1.6 mm thick material minimum for single doors; 1.98 mm thick material for frames with opening widths 1067 mm or wider; welded type construction; 50 mm face standard frame profile, throat and frame width to suit wall construction.
Blank, drill, reinforce and tap frames to receive mortised, templated hardware, security and electrical devices, using templates provided by finish hardware supplier. Reinforce frames for installation of closers. Install stiffener plates or two angle spreaders where required to prevent bending of frame and to maintain alignment when setting. Weld reinforcement in place.

Protect mortised cutouts with steel guard boxes where required (masonry/concrete construction).

Provide three resilient bumpers per single door at the strike jamb. Provide two resilient bumpers per door leaf at the head of double doors.

Conceal fastenings except where exposed fastenings are indicated.

Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

Provide fire labelled frames for those openings requiring fire protection ratings, as indicated in as scheduled on Drawings.

Extend lead sheet radiation protection, lead sheet thickness to match adjacent door and walls, into frames at radiation rated door and wall locations: all Operatory rooms and PAN room.

**FRAME ANCHORAGE**

Provide appropriate anchorage to floor and wall construction.

Where frames terminate at finished floor, supply floor plates for anchorage to slab. Check depth of extension of finished floor to structural slab and provide jamb extension anchorage as required. Provide 50 mm minimum adjustment.

Locate wall anchors immediately above or below each hinge reinforcement on the hinge jamb, and directly opposite on the strike jamb. Provide minimum three anchors per jamb for frames up to 2388 mm in height. Add one anchor per jamb for each additional 760 mm or fraction thereof in frame height.

Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

**FRAMES: WELDED TYPE**

Install welded frames at new partitions and new retrofit locations prior to installation of new gypsum board.

Welding in accordance with CSA W59.

Cut frame mitres accurately and weld on inside of frame profile. Fill frame corners, exposed surface depressions and butt joints with air drying paste filler. Sand to a smooth uniform finish. Touch up damaged galvanized finish with zinc rich primer.

Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
.6 Securely attach floor anchors to inside of each jamb profile.

.7 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.10 DOOR FABRICATION: GENERAL

.1 Doors: swing type, flush, with provision for openings as indicated.

.2 Fabricate doors with longitudinal edges locked seamed with adhesive and spot-welded for larger doors. Seams: not visible, grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish. Bevel both stiles of single doors 1 in 16.

.3 Provide fixed transoms, side panels and base panels where indicated or scheduled, of same materials, gauge, thickness, construction and finish as door. Reinforce transoms and panels to prevent oil canning. Install transoms and panels with concealed fastenings, and reinforce to accommodate hardware as required. Seal joint between transom or panel airtight. Provide accurately formed ship lap joint between door and transom panel where no transom rail occurs.

.4 Mortise, reinforce, drill, and tap doors to receive templated hardware, security, and electrical devices.

.5 Reinforce doors where required for surface mounted hardware. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.6 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.7 Cut-outs: Where openings are required, provide integrally formed cut-outs with steel framing, and closely fitted steel glass and grille stops, as required. Mitre corners of stops. Drill and countersink fasteners symmetrically at 150 mm o.c. Supply and install coated steel stops, with same coating type and thickness as doors. Screw stops in place.

.8 Supply and install steel vent grilles in doors where indicated.

.9 Equip top and bottom of lead lined doors with nominal 1.60 mm continuous flush steel non-removable end caps welded securely in place.

.10 Provide fire labelled doors for those openings requiring fire protection ratings, as indicated on Drawings.

.11 Fabricate doors with the following clearances:

.1 Clearance between door and frame and between meeting edges of doors swinging in pairs shall not exceed 3 mm.

.2 Clearance between the bottom of door and floor shall not exceed 19 mm or as required to accommodate specified hardware.

.3 Clearance between bottom of door and a raised non-combustible sill in accordance with NFPA 80.

.4 Clearance between bottom of door and nominal surface of combustible floor coverings in accordance with NFPA 80.

.12 Top and bottom of doors shall be provided with inverted, recessed, nominal 1.60 mm steel end channels, welded to each face sheet at 150 mm on centre.
.13 Provide flush top and bottom steel edge caps on doors to stair shafts.

.14 Provide touch-up primer at areas where zinc coating has been removed or damaged during fabrication.

.15 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN/ULC S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.16 Manufacturer's nameplates on doors are not permitted.

2.11 FABRICATION: INTERIOR DOORS

.1 Interior Doors: Flush, lock seam construction, hollow steel doors fabricated in accordance with CSDMA Manufacturing Specifications for Doors and Frames, and as follows:

   .1 Face sheets: Minimum 1.30 mm base steel sheet thickness.

   .2 Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.

   .3 Longitudinal edges mechanically interlocked, adhesive assisted with edge seams continuous welded, sanded flush with no visible seam.

   .4 Equip pairs of fire labelled doors with minimum 2.74 mm steel surface mounted flat bar astragal, welded to door face; plug welded on face and stitch welded to butt edge of door.

   .5 Labelled by Underwriters Laboratories of Canada, ITS/Warnock Hersey, or other testing laboratory approved by the authority having jurisdiction.

2.12 FABRICATION: FIRE RATED DOORS

.1 Face sheets: Minimum 1.6 mm base steel sheet thickness.

.2 Equip fire labelled doors with factory installed flush steel caps.

.3 Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.

.4 Longitudinal edges mechanically interlocked, adhesive assisted with edge seams continuous welded, sanded flush with no visible seam.

.5 Equip pairs of fire labelled doors with minimum 2.7 mm (0.105") steel surface mounted flat bar astragal, shipped loose for application on site.

2.13 FABRICATION: RADIATION PROTECTION DOORS

.1 Radiation Protection Doors:

   .1 Face sheets: Minimum nominal 1.6 mm base steel sheet thickness.

.1 Products shall comply with requirements of local regulatory agencies where standards and criteria exceed NCRP Report 147.

.3 150 kv Rated (PAN Room): Interior voids completely filled, stiffened, insulated and sound deadened with composite core comprising 2.5 mm thick (34 kg/m²) 99.9% pure sheet lead on the inside front face skin, both bevels, inside top and bottom channels and honeycomb core, laminated under pressure to each face sheet.

.4 Vision glass shall be lead-lined and require X-Ray Safety Glass labeled as impact resistant meeting the requirements of ANSI Z97.1 and CPSC 16 CFR 1201 Category 2. (If fire-rated, additional clear ceramic fire-rated glazing is required).

2.14 LAMINATED CORE CONSTRUCTION

.1 Form face sheets for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.15 PRIMER

.1 Touch-up primer: Commercial rust inhibitive primer, shop prime coat doors and frames before delivery; grey or red coloured primer; in accordance with Section 09 91 00 – Painting. Clear primer not acceptable; provide primer for field touch-up.

2.16 PAINT

.1 Field paint steel doors and frames in accordance with Section 09 91 00 - Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

.2 Colour: as selected by Consultant from manufacturer’s colour selections; submit colour cards for initial selection prior to ordering materials.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work means acceptance of existing conditions

3.3 INSTALLATION GENERAL

.1 Install fire rated doors and frames in accordance with requirements of NFPA 80.

.2 Install doors and frames to, CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.
3.4 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.
.2 Secure anchorages and connections to adjacent construction.
.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
.5 Install hollow metal window frames at interior locations as indicated.
.6 Install door silencers.
.7 Caulk perimeter of frames between frame and adjacent material.
.8 Maintain continuity of air barrier and vapour retarder.
.9 Extend lead sheet radiation protection, lead sheet thickness to match adjacent door and walls, into frames at radiation rated door and wall locations, similar to the following:

![Diagram of frames with lead sheet radiation protection]

3.5 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's printed installation instructions and technical datasheets.
.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
   .1 Hinge side: 1.0 mm.
   .2 Latchside and head: 1.5 mm.
   .3 Finished floor, top of carpet, non-combustible sill, or thresholds: 6 mm.
.3 Adjust operable parts for correct function.
3.6 FINISH REPAIRS
.1 Touch-up areas where galvanized coating has been removed or damaged with primer.
.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.7 FIELD PAINTING
.1 Field painting: to Section 09 91 00.
.2 Paint doors after finish repairs, and prior to glazing and installation of door hardware.

3.8 GLAZING
.1 Install glass after field painting has been completed and the paint has dried.
.2 Comply with GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds; glaze in accordance with GANA Glazing Manual.
.3 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
.4 Install vision panels in fire rated doors to requirements of NFPA 80 and Ontario Building Code 2012 and Amendments, and to fire glass manufacturer’s printed specifications and installation requirements.
.5 Install vision panels in radiation rated leaded doors to requirements of Ontario Building Code 2012 and Amendments, authorities having jurisdiction, and to radiation rated leaded glass manufacturer’s printed specifications and installation requirements.

3.9 DOOR HARDWARE
.1 Comply with manufacturer’s printed installation instructions, technical datasheets, details, and specifications.
.2 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
.3 Remove construction cores when directed by Consultant; install permanent cores and check operation of locks.
.4 Use only manufacturer's supplied fasteners.

3.10 ADJUSTING
.1 Adjust doors for smooth and balanced door movement.
.2 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
.3 Lubricate hardware, operating equipment and other moving parts.
.4 Adjust door hardware to provide tight fit at contact points with frames.
.5 Clean doors and frames.
3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements.

.1 Leave Work area clean at end of each day.

.2 Immediately clean adjacent surfaces that have been soiled and leave work in a neat, clean condition. Remove excess materials and droppings using recommended cleaners and solvents.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements.

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.12 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

.1  Section 08 11 13 – Metal Doors and Frames.
.2  Section 08 56 13 – Passthrough Windows.
.3  Section 08 71 00 – Door Hardware.
.4  Section 09 21 16 – Gypsum Board Assemblies.
.5  Section 09 91 23 – Interior Painting.

1.2  REFERENCES

.1  American National Standards Institute (ANSI)
   .1  ANSI A208.1-2009, Particleboard.

.2  Architectural Woodwork Manufacturers Association of Canada (AWMAC)

.3  ASTM International (ASTM)

.4  Canadian General Standards Board (CGSB)

.5  Canadian Standards Association (CSA International)
   .1  CSA O115 M1982(R2001), Hardwood and Decorative Plywood.
   .2  CAN/CSA O132.2 Series-90 (R1998), Wood Flush Doors.

.6  CSA International (CSA)
   .1  CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

.7  Health Canada

.8  National Council on Radiation Protection and Measurements (NCRP)
1.3 X-RAY RADIATION SHIELDING CRITERIA

.1 Work shall comply meet or exceed the requirements of the following as they apply to project conditions:

.1 Health Canada Safety Codes 20A, 30 and 32, requirements of Ministry of Labour, requirements of Ontario Health and safety Act and Regulations, Ontario Healing Arts Radiation Protection Act and Regulations, requirements of authorities having jurisdiction, and applicable requirements of NCRP Report No. 145 and NCRP Report No. 147.

.2 Operators:

.1 X-Ray Protection Criteria: peak voltages in Operators not to exceed 75 kV. Minimum lead sheet thickness: 1 mm thick (12.2 kg/m²) 99.99% pure commercial sheet lead, to ASTM B29.

.3 PAN Room:

.1 X-Ray Protection Criteria: peak voltages in PAN Room not to exceed 150 kV. Minimum lead sheet thickness: 2.0 mm thick (24.4 kg/m²) 99.99% pure commercial sheet lead, to ASTM B29.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate door types and cutouts for lights and louvres, sizes, core construction, transom panel construction and cutouts.

.3 Lead Lined Door Submittals:

.1 Submit evidence that fabricator / manufacturer has requisite experience.

.2 Submit proof of specified insurance coverage.

.4 Submit specified test reports and certificates.

.5 Submit warranties.
1.5 SAMPLES

.1 Submit samples in accordance with Division 01 – General Requirements.

.2 Submit one 300 x 300 mm sample of each type wood door finish.

.3 Show door construction, core, glazing detail and faces.

.4 Manufacturer's Instructions:
   .1 Submit manufacturer's installation instructions.

1.6 QUALITY ASSURANCE

.1 Fabricate doors in accordance with the AWMAC/AWI Architectural Woodwork Standards, Section 9 - Doors, Premium grade.

.2 Manufacturer Qualification: Manufacturer specializing in products in this section who have a minimum of five years of documented experience and are a member in good standing of the Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.3 Lead Lined Wood Doors: fabricator / manufacturer shall be experienced in, and equipped and insured for fabrication equal to standards specified herein. The fabricator shall furnish evidence of manufacturer having not less than 10-years experience in successful fabrication of radiation protection materials similar to products specified herein.
   .1 Fabricator shall furnish proof of insurance certifying Fabricator is specifically insured in the fabrication of X-Ray Protection / Radiation Shielding Materials.
   .2 Single source responsibility: all lead lined wood doors shall be provided by the same fabricator / manufacturer.

.4 Test Reports: certified test reports showing compliance with specified performance characteristics, and physical properties.

.5 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Delivery and Acceptance Requirements:
   .1 Deliver doors and panels to minimize storage on site and when site conditions conform to requirements for storage.

.2 Storage and Protection:
   .1 Store and handle doors and panels in accordance with AWMAC requirements, and as follows:
      .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
      .2 Store doors in well-ventilated room, off floor, in accordance with manufacturer's recommendations.
      .3 Protect doors from scratches, handling marks and other damage.
      .4 Store doors away from direct sunlight.
1.8 WARRANTY

.1 Provide warranty issued in the name of the Owner stating that doors are warranted against defects in materials and workmanship for the life of the original installation.

.2 Warranty to include coverage for reasonable amount to remove, replace, refinish, and re-hang doors that do not meet accepted AWMAC tolerances.

Part 2 Products

2.1 LEAD LINED DOORS – OPERATORY SLIDING WOOD DOORS


.1 Products shall comply with requirements of local regulatory agencies where standards and criteria exceed NCRP Report 147.

.2 Doors shall be fabricated of particleboard core construction with one or more continuous layers of unpierced lead sheet(s) equivalent to same lead thickness as in surrounding partition that door occurs in and clearly labeled on door.

.3 X-Ray Protection Criteria: peak voltages in Operatories not to exceed 75 kV. Minimum lead sheet thickness: 1 mm thick (12.2 kg/m²) 99.9% pure sheet lead, to ASTM B29.

.4 Core: Dense particleboard meeting or exceeding ANSI A208.1 Grade M-3, minimum 750 kg/m³.

.5 Vertical edges: match Solid Core Doors.

.6 Top and bottom rails: match Solid Core Doors.

.7 Faces: match Solid Core Doors.

2.2 SOLID CORE DOORS

.1 Flush wood doors: solid core to AWMAC Standard.

.2 Dry lumber to an average moisture content of between 6 and 12% maximum at time of manufacture.

.3 Construction:

.1 Solid Wood Core (S-P-F): glued block core with 5 mm thick S-P-F wood edge band, and as follows:

.1 Construction: 5-ply.

.2 Use: interior.

.2 Door cores to be fully bonded and abrasive planed or sanded prior to laminating faces to core materials.

.3 Door Thicknesses:

.1 45 mm overall for swing doors.

.2 35 mm overall for sliding doors.
.4 Face Panels (for Painting):

.1 Tempered high-density fiberboard (THDF): to CGSB-11-GP-3M, Type 2, minimum density 500 kg/m³, ¼” (6.35 mm) nominal thick, one face baked smooth finish suitable for painted finish, having the following minimum properties:

.1 Modulus of Rupture: ≥4300 psi.
.2 Internal bond: ≥70 psi.
.3 Density (average value): 54 lbs./ft³.
.4 Moisture content (average value): 3-5%.
.5 Formaldehyde emissions: <0.03 ppm.

.5 Adhesive: Type I (waterproof)

.6 Metal Door Frames: Refer to Section 08 11 13 – Steel Doors and Frames.

2.3 HARDWARE

.1 Regular swing door hardware: refer to Door Hardware Schedule.

.2 Sliding door hardware package for each sliding door location:

.1 Hardware system for wooden sliding doors:

.1 Similar to Richelieu C-810 Zero-clearance hanger, machine-steeled, zero-clearance hanger allows a load capacity for heavy doors up to 136 kg (300 lbs.), Constructed using four precision ball-bearing, nylon-tire wheels on a solid machined-steel body. Include complete mounting kit, fasteners, cushioned stops, and accessories as required and recommended by manufacturer for a complete, properly functioning sliding door installation.

.2 Pulls: similar to Richelieu Surface-Mount Twin Handle – 24620710432, suitable for sliding door thickness.

.1 Apply lead piece same thickness as used to line door to holes created for pulls to ensure continuity of radiation protection.

2.4 FABRICATION

.1 Fabricate doors in accordance with AWMAC section 9.

.2 Vertical edge band: 5 mm thick S-P-F wood edge, to match core species.

.3 Doors shall be pre-fitted, bevelled and machined at the factory for all mortise hardware items in accordance with hardware templates.

.4 Coordinate with other trades as required.

.5 Bevel vertical edges of single acting doors 3 mm in 50 mm on lock side, and 1.5 mm in 50 mm on hinge side.
2.5  FINISHING

.1  Painted Finish (both vertical edges, top and bottom edges, and both faces):
refer to section 09 91 00, semi-gloss finish; minimum 3-coat system: primer, intermediate
coat, topcoat. Finish to AWS premium grade.

.2  Provide materials for touch-up of finishes.

Part 3  Execution

3.1  MANUFACTURER'S INSTRUCTIONS

.1  Compliance: comply with manufacturer's printed installation instructions, technical
datasheets, requirements of insurers, warranty requirements, and specifications.

3.2  INSTALLATION

.1  Unwrap and protect doors in accordance with AWMAC.

.2  Coordinate with the work of Section 09 21 16 - Gypsum Board Assemblies and
Section 08 11 13 – Steel Doors and Frames as required.

.3  Install doors and hardware in accordance with manufacturer's printed instructions and
AWMAC guidelines.

.4  Adjust hardware for correct function.

3.3  ADJUSTMENT

.1  Re-adjust doors and hardware just prior to completion of project to function freely and
properly.

3.4  CLEANING

.1  Progress Cleaning: clean in accordance with Division 01 General Requirements. Leave
Work area clean at end of each day.

.2  Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment
in accordance with Division 01 General Requirements. Perform cleaning after installation
to remove construction and accumulated environmental dirt.

.3  Manage and dispose of demolition and construction waste materials in accordance with
Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.5  PROTECTION

.1  Protect installed products and components from damage during construction.

   .1  Repair damage to adjacent materials caused by Work of this Section.
3.6 CLOSEOUT ACTIVITIES

.1 Deficient Work:
  .1 Replace, rework or refinish work that does not meet AWS Manual requirements
     as directed by Consultant.

.2 Adjusting:
  .1 Readjust doors and hardware just prior to completion of building to function
     freely and properly and as follows:
    .1 Re-hang or replace doors that do not swing or operate freely.
    .2 Replace doors that are damaged or that do not comply with requirements
       of this Section; doors may be repaired or refinished where work complies
       with requirements and shows no evidence of repair or refinishing in
       completed work.

END OF SECTION
Part 1  General

1.1  RELATED REQUIREMENTS

.1  Section 06 10 00 – Rough Carpentry.
.2  Section 07 84 00 – Firestopping.
.3  Section 07 92 00 – Joint Sealants.
.4  Section 08 81 00 – Glazing.
.5  Section 09 21 16 – Gypsum Board Assemblies.

1.2  REFERENCES

.1  American National Standards Institute (ANSI):
      Performance Specifications and Methods of Test.
  
  .2  ASME International (ASME)
  .1  ASME B18.6.3-2013, Machine Screws, Tapping Screws, and Metallic Drive
      Screws, Inch Series.
  .2  ASME B18.6.4-1998(R2005), Thread Forming and Thread Cutting Tapping
      Screws and Metallic Drive Screws, Inch Series.
  
  .3  ASTM International
  .1  ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized)
      Coatings on Iron and Steel Products.
  .2  ASTM A569 / A569M - 91a(1993)e1, Standard Specification for Steel, Carbon
      (O. 15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
  .3  ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated
      (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .5  ASTM C1036-11e1, Standard Specification for Flat Glass.
  .6  ASTM C1048 - 12e1, Standard Specification for Heat-Strengthened and Fully
      Tempered Flat Glass.
  .7  ASTM B776-12, Standard Specification for Hafnium and Hafnium Alloy Strip,
      Sheet, and Plate.
  .8  ASTM E283-04(2012), Standard Test Method for Determining Rate of Air
      Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified
      Pressure Differences Across the Specimen.
  .9  ASTM E330/E330M-14, Standard Test Method for Structural Performance of
      Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air
      Pressure Difference.
  .10 ASTM E547-00(2016), Standard Test Method for Water Penetration of Exterior
      Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure
      Difference.

.4 Canadian General Standards Board (CGSB).
.1 CAN/CGSB 12.1-M90, Tempered or Laminated Safety Glass.

.5 CSA International (CSA)
.2 CSA A440.2-14/A440.3-14, Fenestration energy performance/User guide to CSA A440.2-14.
.3 CAN/CSA A440.4-07 (R2016) - Window, Door, and Skylight Installation
.4 CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

.6 Glass Association of North America (GANA)

.7 National Fire Protection Association (NFPA)
.4 NFPA (Fire) 257: Standard on Fire Test for Window and Glass Block Assemblies, 2017 Edition.

.8 Safety Glazing Certification Council (SGCC)

.9 Standards Council of Canada
1.3 SUBMITTALS

.1 Submit in accordance with Division 01 – General Requirements:

.2 Product Data:

.1 Submit manufacturer’s printed product literature, specifications and technical datasheets describing materials, components, fabrication, finishes and installation instructions.

.3 Shop Drawings:

.1 Submit shop drawings, including plans, elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, glazing, fasteners, hardware, finish, electrical wiring diagrams, options, and accessories.

.4 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.1 Provide testing and analysis of glass under provisions of Division 01 General Requirements.

.2 Provide shop inspection and testing for glass.

.5 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Glazing for Fire-Rated Door and Window Assemblies: Glass tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labelled per requirements of authorities having jurisdiction.

1.4 QUALITY ASSURANCE

.1 Installer Qualifications: Experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

.2 Manufacturer's Qualifications: A firm with not less than 10-years experience in manufacture of similar type steel passthrough windows.

.3 Single Source Requirements: all passthrough windows required for this Contract shall be fabricated and supplied by the same manufacturer.

1.5 PROJECT CLOSEOUT SUBMITTALS

.1 Provide operations and maintenance information in accordance with Division 01 – General Requirements.

.2 Submit maintenance information including; but not limited to, adjustment and cleaning instructions, trouble shooting guide, list of spare parts and maintenance materials, electrical wiring diagrams and telephone numbers for repair and servicing contacts.

1.6 WARRANTY

.1 Provide manufacturer’s standard warranty, which shall be 3-years from the date of Substantial Performance.
Part 2 Products

2.1 MATERIALS

.1 Steel Frames and Inserts:
   .1 Steel frames and inserts shall be fabricated from roll-formed galvanized lock-
   forming quality steel per ASTM A653.
   .2 Frame and insert corners shall mitered and welded. Integral muntins where
   required shall be galvanized roll-formed material fitted and welded.
   .3 Operable insert/sash shall be supported on two adjustable heavy-duty spiral
   wound balances.

.2 Manufacturer’s Installation Kits:
   .1 Provide attachable fin installation kits for all windows.
   .2 Provide sub-frame installation kits for all windows.

.3 Weather Stripping:
   .1 Weather-stripping for the inserts shall be designed to meet water penetration and
   air infiltration requirements specified under Performance Criteria, and shall be
   manufactured of material compatible with steel and resistant to weather.
   Weather-strips shall be factory applied and easily replaced in the field.

.4 Formed Component Parts:
   .1 Formed component parts shall be hot-rolled sheet steel conforming to
   ASTM A569, commercial quality with a minimum of 0.15 percent carbon.
   .2 Sheet steel shall be zinc coated (galvanized) by the hot-dip process in accordance
   with ASTM A653.

.5 Screws and Bolts:
   .1 Screws and bolts shall conform to ASTM B766 Grade R3 Commercial,
   ASME B18.6.3 and ASME B18.6.4.

.6 Fasteners:
   .1 Fastening devices shall be window manufacturer’s design made from cadmium-
   plated steel, zinc-plated steel, nickel/chrome-plated steel or magnetic stainless
   steel.

.7 Window Anchors:
   .1 Anchors for installing windows shall be stainless steel or hot-dip zinc coated steel
   conforming to ASTM A123.

.8 Glass and Glazing:
   .1 Type S04 Passthrough Window: Fully Tempered Glass, to Section 08 81 00 –
   Glazing, Type GL1 Safety Glass, minimum 7 mm thick.
   .2 Type S03 Fire-Rated Passthrough Window: Fire Rated Glass, to Section 08 81 00
   – Glazing, Type GL3 Fire Rated Glass, minimum 8 mm thick.
2.2 **FIRE-RATED PASSTHROUGH WINDOWS (TYPE S04)**

.1 Premanufactured single-hung fire-rated passthrough window assembly shall meet the requirements specified following, and comply with the general design intent as indicated.

.2 Code Criteria:

.1 Pre-manufactured passthrough window assemblies shall be cULus, ULC or cUL labelled, and shall pass the following minimum test criteria:


.3 Performance Criteria:

.1 Notwithstanding actual locations indicated for this Contract, passthrough assemblies shall be designed and tested to meet or exceed the following performance requirements:

.1 Structural Performance: Structural test pressures on window units shall be for positive load (inward) and negative load (outward) in accordance with ASTM E330 at a static pressure of 45 PSF. After testing, there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms or any other damage which could cause window to be inoperative. There shall be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by CSA A440 for the window types specified in this Section.

.2 Air Infiltration: Air infiltration shall not exceed .3 SCFM per square foot of window area at a static air pressure difference of 1.57 PSF as established by CSA A440 when tested in accordance with ASTM E283.

.3 Water Resistance: When tested in accordance with ASTM E547, there shall be no water leakage at a static air pressure difference of 4.50 PSF.

.4 Life Safety Criteria: Windows shall conform to NFPA 101 Life Safety Code when rescue and/or second means of escape are indicated.

.5 Fire Rating: not rated.

.6 Operation: single-hung.

.7 Size: as indicated.

.8 Glass: Glazing, Type GL1 Tempered Safety Glass.

.9 Framing, hardware and accessories: premanufactured complete assembly with factory-installed glass, complete assembly meeting requirements of this Section.

2.3 **FABRICATION**

.1 Units shall be factory assembled and glazed, ready for installation, and labelled as required to meet Code requirements. Fire rated unit shall be rated for 1-hour.

.1 Obtain governing site dimensions and installation requirements and coordinate site conditions so that pre-assembled unit requirements are met before shipping to site.
.2 Frame sections shall be one piece sections with corners mitered, welded and dressed smooth.
.3 Required muntins shall be securely welded to the frame members and at all intersections.
.4 All windows shall be designed for inside glazing.

2.4 FINISHES

.1 Units shall be factory-finished.
.2 Prime Coat: steel windows, fins, mullions, cover plates and associated parts shall be cleaned, pre-treated with iron phosphate and factory-painted manufacturer's standard primer coat in a dry film thickness of not less than 0.025 mm (1.0 mil).
.3 Finish Coat - Specified Colour Match: steel windows, fins, mullions, cover plates and associated parts shall be cleaned, pre-treated with iron phosphate and factory powder coated and cured in a dry film thickness of not less than 0.050 mm (2.0 mil); colour shall be as selected by Consultant from manufacturer’s full range.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas to receive passthrough windows.
.2 Install units only when conditions that would adversely affect installation or subsequent use are corrected.

3.2 PREPARATION

.1 Verify that openings to receive pass-thru windows are plumb, level, square, accurately aligned, correctly located, and in tolerance.

3.3 INSTALLATION

.1 Install passthrough windows in accordance with manufacturer's printed instructions and technical datasheets, plumb, level, square, true to line, and without warp or rack, and with window components meeting design intent and Code requirements.
.2 Fire-rated windows shall be installed in compliance with NFPA (Fire) 80 and NFPA (Fire) 101, and meeting requirements of authority having jurisdiction.
.3 Anchor passthrough windows securely in place to supports; use attachment methods permitting adjustment for construction tolerances, irregularities, alignment, and expansion and contraction.
.4 Steel surfaces in close proximity with masonry, concrete, wood, and dissimilar metals other than stainless steel, zinc, cadmium, or small areas of white bronze shall be protected from direct contact.
.5 Install joint sealants as specified in Section 07 92 00.
.6 Repair minor damages to finish in accordance with manufacturer's instructions.
.7 Remove and replace damaged components that cannot be successfully repaired.

3.4 ADJUSTING

.1 Adjust passthrough windows and operating hardware to function as designed to requirements of authority having jurisdiction, and for smooth operation without binding.

.1 Operable sash shall be adjusted per manufacturer’s instruction to provide minimal operating force.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements.

.1 Leave Work area clean at end of each day.

.2 Immediately clean adjacent surfaces that have been soiled and leave work in a neat, clean condition. Remove excess materials and droppings using recommended cleaners and solvents.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements.

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION
**Part 1  General**

### 1.1 RELATED SECTIONS

1. Section 08 11 13 – Metal Doors and Frames.
2. Section 08 56 13 – Passthrough Windows.

### 1.2 REFERENCES

1. ASTM International (ASTM)
   - ASTM C1048 - 12e1, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

2. Canadian General Standards Board (CGSB)
   - CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
   - CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
   - CAN/CGSB-12.8-97 AMEND, Insulating Glass Units.
   - CAN/CGSB-12.11-M90, Wired Safety Glass.

3. CSA International (CSA)
   - CSA A440.2-14/A440.3-14, Fenestration energy performance/User guide to CSA A440.2-14.
1.3 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meetings: one week prior to beginning work of this Section.
  .1 Verify project requirements.
  .2 Review installation conditions.
  .3 Coordinate with other building trades.
  .4 Review manufacturer's instructions and warranty requirements.

1.4 SUBMITTALS

.1 Submit in accordance with Division 01 General Requirements.
  .2 Product Data:
    .1 Submit manufacturer's printed product literature, specifications and data sheet.
  .3 Samples:
    .1 Submit 300 mm x 300 mm size of each glazing type. Consultant reserves the right to change colour of glass after review of submitted samples.
.4 Manufacturer's Instructions:
   .1 Submit manufacturer's installation instructions.

.5 Closeout Submittals:
   .1 Provide maintenance data including cleaning instructions for incorporation into
      manual specified in Division 01 General Requirements.

1.5 QUALITY ASSURANCE

   .1 Manufacturer’s technical recommendations:
      .1 Perform glazing work in accordance with written recommendations from the glass
      manufacturer or glass fabricator.
      .2 Certify glass compatibility with glazing materials (i.e. insulating glass sealants,
      structural sealants and silicones, gaskets, setting blocks, etc.)
      .3 Designs to be analyzed for thermal stress.
      .4 Provide shop inspection for glass.

   .2 Test Reports: certified test reports showing compliance with specified performance
      characteristics and physical properties.
      .1 Provide testing and analysis of glass under provisions of Division 01 General
      Requirements: Quality Control.
      .2 Provide shop inspection and testing for glass.

   .3 Certificates: product certificates signed by manufacturer certifying materials comply with
      specified performance characteristics and criteria and physical requirements.

   .4 Glazing for Fire-Rated Door and Window Assemblies: Glass tested per NFPA 252 and
      NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and
      labelled per requirements of authorities having jurisdiction.

1.6 SITE CONDITIONS

   .1 Environmental Requirements:
      .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain
      ventilated environment for 24 hours after application.
      .2 Maintain minimum ambient temperature before, during and 24-hours after
      installation of glazing compounds.

1.7 WARRANTY

   .1 Provide manufacturers guarantee for the following types of glass listed, against defects in
      materials and workmanship for the period indicated, commencing from the date of
      Substantial Performance of Work.
      .1 Sealed Glass Units: Replace units that exhibit failure of hermetic seal under
      normal use evidenced by the obstruction of vision by dust, moisture, or film on
      interior surface of glass: 2-Years.
Part 2 Products

2.1 MATERIALS:

.1 Type GL1: Safety Glass, to CAN/CGSB 12.1, transparent, glazing quality, 7 mm minimum thickness.
   .1 Type: 2-tempered.
   .2 Class: B-float.
   .3 Category: II impact resistance.
   .4 Edges: flat belt ground and seamed.

.2 Type GL2: Leaded Glass, transparent, optical grade, mirror polished, 7 mm thick minimum for non-fire-rated glass; leaded for radiation protection.
   .1 Lead equivalency: 2.0 mm.
   .2 X-Ray peak voltage: 150 kV.
   .3 Moh's hardness scale: Level 6.
   .4 Edges: flat belt ground and seamed.
   .5 Labelling: X-Ray Safety Glass labeled as impact resistant meeting the requirements of ANSI Z97.1 and CPSC 16 CFR 1201 Category 2.
   .6 Factory-laminate 60 minute Fire Rated Glass to Leaded Glass for locations that require both ratings (refer to Type GL3).

.3 Type GL3: Fire Rated Glass, transparent, glazing quality, comprised of multiple layers of tempered glass ceramic, laminated with transparent intumescent materials, providing distortion free viewing through pane, meeting requirements of authority having jurisdiction, and as follows:
   .1 Minimum Thickness: 8 mm or greater as required to achieve fire rating.
   .2 Edges: flat belt ground and seamed.
   .3 Approximate Visible Transmission: 85 percent.
   .4 Approximate Visible Reflection: 9 percent.
   .5 STC Rating: Approximately 38 dB.
   .6 Impact Safety Rating: ANSI Z97.1 Category II rated.
   .7 Fire Rating Requirement: 60 minutes.
   .8 Temperature Rise Rating: Not required.
   .9 Labelling: Fire Rated Safety Glass labeled for 60 minutes and as impact resistant meeting the requirements of ANSI Z97.1 and CPSC 16 CFR 1201 Category 2.

2.2 ACCESSORIES

.1 Joint Sealants: to Section 07 92 00 – Joint Sealants.

.2 Pressed steel frames, fire rated and non-fire rated as required: to Section 08 11 13 – Metal Doors and Frames.

.3 Glazing Tape: pre-shimmed closed cell polyvinyl chloride (PVC) foam tape, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings to be glazed with fire-rated glazing tape supplied by manufacturer.
.4 Silicone Sealant (Cap, Toe and Heel Beads): One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.1 Acceptable Materials:
.1 Dow Corning 795, Dow Corning Corp..
.2 Silglaze-II 2800, General Electric Co..
.3 Spectrem 2, Tremco Inc..

.5 Setting blocks: 100% silicone; 85±5 Shore A Durometer hardness; centered at quarter points and be 1/16” (1.6 mm) less than the channel width; Setting blocks shall be 3/32” (2.5 mm) in length for each square foot (0.09 square metre) of glass area, but never less than 4” (102 mm) in length.

.6 Edge blocks or anti-walk blocks: 100% silicone; 60±5 Shore A Durometer hardness; minimum 4” (102 mm) in length. Used for dry glazed systems, install in vertical channel with a 1/8” (3 mm) clearance between glass edge and block.

.7 Other Glazing Accessories: to CAN/CSA A440.

.8 Screws, bolts and fasteners: to ASTM F738M; Type 304 stainless steel.

.9 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.3 FABRICATION

.1 Fabricate glass and other glazing products in sizes required to glaze openings indicated for Contract, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

.2 Clearly label each glass light with maker's name, weight, quality, type and certification number. Do not remove labels until after work has been reviewed by Consultant.

Part 3 Execution

3.1 COMPLIANCE

.1 Compliance: Comply with manufacturer's printed fabrication and installation instructions, technical datasheets, and specifications.

.2 Size glass to requirements of Ontario Building Code 2012 and Amendments, and verify glass for openings are correctly sized and are within allowable tolerances. Install glass with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

.3 Perform work in accordance with GANA Glazing Manual for glazing installation methods.
3.2 EXAMINATION

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Commencement of work means acceptance of existing conditions.

3.3 PREPARATION

.1 Ensure all glazing rebates are smooth and true, free of projections nails, screws, fastenings properly set to prevent contact with glass.

.2 Ensure all stops, gaskets, glazing accessories provided by others are accurately cut to length and proper size and type for specific glazing.

.3 Temporarily remove glass stops from openings, and mark to ensure accurate re-installation.

.4 Clean contact surfaces with solvent and wipe dry (ensure proper ventilation).

.5 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.6 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION – DRY METHOD (TAPE / TAPE)

.1 Perform work in accordance with GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

.2 For fire rated glazing, comply with fire rated glass manufacturer’s printed installation instructions. Installation shall satisfy requirements of Ontario Building Code 2012 and Amendments, and requirements of authority having jurisdiction.

.1 Install vision panels in fire rated doors to requirements of NFPA 80.

.2 Install so that appropriate fire rating labels and markings remain permanently visible.

.3 Glazing Tape Application:

.1 Measure width of glazing rabbet to ensure that tape thickness is appropriate.

.2 Apply double-faced closed cell PVC foam glazing tape to glass backstops on all four sides.

.3 Extend vertical tape full height of the opening, and tightly butt-joint horizontal tape at all four corners.

.4 Hold back tape 1/16” (1.6 mm) from top edge of stops.

.5 Maintain straight tape lines, and press tape firmly into place after initial positioning.

.6 Remove plastic release liner from glazing tape to expose adhesive surface. Remove liner slowly to avoid tearing. After removal of liner, check to make sure tape is straight and uniform. If replacement is necessary, carefully remove tape with a sharp razor blade and reinstall a new piece.
.4 Setting Block Installation:
   .1 Centre setting blocks at quarter points. Setting blocks shall be 1/16" (1.6 mm) less than the channel width and 3/32" (2.5 mm) in length for each square foot (0.09 square metre) of glass area, but never less than 4" (102 mm) in length.
   .2 Install edge blocks (anti-walk blocks) in vertical channel with a 1/8" (3 mm) clearance between glass edge and block.
   .3 If blocks do not come into contact with adhesive glazing tape, use a small dab of clear silicone to hold them in place.

.5 Glass Installation:
   .1 Clean glass.
   .2 Measure and dry-fit glass pane prior to installation to ensure proper fit and equal reveal between glass and opening.
   .3 Ensure required labels are located at bottom of pane facing exterior of opening, and set glass pane in place, applying moderate pressure to ensure uniform adhesion to adhesive tape.

.6 Reveal Caulking:
   .1 Clean glass surfaces to receive sealant. Install specified commercial-grade silicone sealant as required to fill perimeter between glass edge and sides of opening. Tool flat and flush with face of glass.

.7 Glass Stop Installation:
   .1 Peel glazing tape release liner off at bottom.
   .2 Align bottom stop with opening and push directly into glass with moderate pressure to seat glazing tape. Install top stop the same way.
   .3 Install side stops in same manner as bottom and top stops.
   .4 Install fasteners in pre-punched and dimpled holes, securing stops firmly in place.

3.5 FIELD QUALITY CONTROL
   .1 Manufacturer's Field Services: Upon Consultant's written request, schedule and provide periodic site visits by manufacturer's field service representative.

3.6 CLEANING
   .1 Progress Cleaning: clean in accordance with Division 01 General Requirements.
      .1 Leave Work area clean at end of each day.
      .2 Immediately clean adjacent surfaces that have been soiled and leave work in a neat, clean condition. Remove excess materials and droppings using recommended cleaners and solvents.
   .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements.
      .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.
.2 Repair damage to adjacent materials caused by Work of this Section.

3.8 SCHEDULE

.1 Refer to Drawings.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

1  Section 02 41 20 – Selective Interior Demolition.
2  Section 07 92 00 – Joint Sealants.
3  Section 08 11 13 – Metal Doors and Frames.
4  Section 08 14 16 – Flush Wood Doors.
5  Section 08 56 13 – Passthrough Windows.
6  Section 08 81 00 – Glazing.
7  Section 09 22 00 – Non-Structural Metal Framing.
8  Section 09 91 00 – Painting.

1.2  REFERENCES

1  Aluminum Association (AA)
   1 AA DAF-45, Designation System for Aluminum Finishes.
2  ASTM International (ASTM)
   5 ASTM C954-15, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
   6 ASTM C1002-14, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
   7 ASTM C1047-14a, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
   9 ASTM C1396/C1396M-14, Standard Specification for Gypsum Board.

3 Association of the Wall and Ceilings Industries International (AWCI)
4 CSA International (CSA)
   1 CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.
.5 Health Canada

.6 National Council on Radiation Protection and Measurements (NCRP)

.7 Ontario Occupational Health and Safety Act

.8 Ontario Healing Arts Radiation Protection Act

.9 Underwriters’ Laboratories of Canada (ULC)
   .1 CAN/ULC S102-10, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 X-RAY RADIATION SHIELDING CRITERIA
   .1 Work shall comply meet or exceed the requirements of the following as they apply to project conditions:

   .2 Operatories:
      .1 X-Ray Protection Criteria: peak voltages in Operatories not to exceed 75 kV. Minimum lead sheet thickness: 1 mm thick (12.2 kg/m²) 99.99% pure commercial sheet lead, to ASTM B29.

   .3 PAN Room:
      .1 X-Ray Protection Criteria: peak voltages in PAN Room not to exceed 150 kV. Minimum lead sheet thickness: 2.0 mm thick (24.4 kg/m²) 99.99% pure commercial sheet lead, to ASTM B29.
1.4 ACTION AND INFORMATIONAL SUBMITTALS
.1 Submit in accordance with Division 01 – General Requirements.
.2 Product Data:
   .1 Submit manufacturer's printed product literature, specifications, technical datasheets, certifications and testing results for each product specified.

1.5 QUALITY ASSURANCE – X-RAY RADIATION SHIELDING
.1 Installers: Installers and job supervisors for the Work of this Section shall be trained and approved by product manufacturer. Job supervisors shall be certified by manufacturer to have 5-years or more experience in the installation of neutron / radiation shielding.
.2 Single Source Criteria: Obtain lead accessories and lead lined / backed gypsum board products from a single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING
.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.
.2 Deliver lead-lined gypsum board on pallets with tops and sides fully protected and shrink-wrapped with polymer plastic film. Clearly identify brand name, identification, and address of manufacturer or supplier.
.3 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.
.4 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.7 SITE ENVIRONMENTAL REQUIREMENTS
.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
.2 Apply board and joint treatment to dry, frost-free surfaces.
.3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

Part 2 Products

2.1 GYPSUM MATERIALS
.1 Standard Board: to ASTM C1396/C1396M and as follows:
   .1 Type: regular and fire resistant as required.
   .2 Size: 1200 mm x maximum practical length.
   .3 Thickness: as indicated on Drawings.
   .4 Acceptable materials:
      .1 ProRoc Wallboard (Type X), CertainTeed.
2.2 FRAMING MATERIALS

.1 Studs and Tracks: to Section 09 22 00.
.2 Metal furring runners, hangers, tie wires, inserts, anchors.
.3 Drywall furring channels: 0.75 mm core thickness galvanized steel channels for screw attachment of gypsum board.
.4 Resilient clips and furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
.5 Ceiling Grid Suspension System: to Section 09 22 00, except as modified by engineered Shop Drawings in accordance with the requirements of this Section.
2.3 INSULATION MATERIALS

.1 Fibrous Glass Acoustical Insulation For Fire and Smoke Rated Assemblies: Un-faced preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ULC S702; having maximum flame spread and smoke developed of 20/20 in accordance with CAN/ULC S102 and being non-combustible in accordance with CAN/ULC S114 and as follows:

   .1 Type: 1.
   .2 Width: to friction fit in stud spaces.
   .3 Thickness: to fill a minimum of 90% of the cavity thickness.
   .4 Nominal density: 40 kg/m³.
   .5 Acceptable materials:
      .1 Owens-Corning Canada Inc., Sound Attenuation Fire Batts.
      .2 Roxul Inc., Roxul AFB Acoustical Fire Batt.

.2 Fibrous Glass Acoustical Insulation For Non-rated Assemblies: Un-faced, preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ASTM C423, ASTM E90, ASTM E413 and ULC S702 and as follows:

   .1 Type: 1.
   .2 Width: to friction fit in stud spaces.
   .3 Thickness: to fill a minimum of 90% of the cavity thickness.
   .4 Acceptable materials:
      .1 CertainTeed, NoiseReducer, Sound Control Fibre Glass Batts.
      .2 Johns Manville, Sound Shield Glass Fibre Batts.
      .3 Owen-Corning Canada Inc., Quietzone Acoustic Insulation.

2.4 CEILING / WALL ACCESS DOORS

.1 Architectural, flush mounting access panels for gypsum board installation, thickness, and fire rating to match wall assembly, manufacturer’s standard sizes selected to suit access requirements, complete with extruded aluminum frame, concealed hinge and a removable door panel, airtight gasket, and cylinder keyed latch mechanism. Confirm proposed location and number of access doors with Consultant prior to ordering and installation.

   .1 Acceptable materials:
      .1 Acudor Products Ltd.
      .2 Bauco Products Incorporated, Bauco Plus.
      .3 Nystrom Building Products.

2.5 ACCESSORIES – GENERAL

.1 Plastic sheet (poly): 6 mil polyethylene sheet meeting requirements of ASTM D4397.
.2 Steel drill screws: to ASTM C954 or ASTM C1002.
.3 Stud adhesive: as recommended by gypsum board manufacturer.
.4 Laminating compound: as recommended by manufacturer for application and conditions, asbestos-free.
.5 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, PVC, perforated flanges, one-piece length per location. Provide transition caps at the base and head, by Trim-Tex or similar.

.6 Paper-faced metal drywall bead and trim for outside corners and door and window openings where pressed steel frames are not being installed (e.g., Operatory Rooms).

.1 Acceptable materials:

.1 USG Beadex® Brand Paper-Faced Metal Drywall Bead and Trim, or similar with same or better physical properties and performance criteria.

.7 Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted. Include splice plates for joints.

.8 Shadow mould: 35 mm high, snap-on trim, of extruded PVC plastic, colour as selected by Consultant.

.9 Strippable Edge Trim: Extruded PVC with pre-masked L-shaped tape on trim with tear away protective serrated strip for removal after compound and paint is applied, for use at areas where gypsum butts aluminum frames and where gypsum butts concrete or concrete block.

.10 Joint Sealants: in accordance with Section 07 92 00 – Joint Sealants.

.11 Acoustic sealant: non-hardening, non-skinning, permanently flexible and having VOC content less than the VOC limits of State of California’s South Coast Air Quality Management District Rule #1168.

.12 Insulating Strip / Acoustic Strip: rubberized, moisture-resistant, 3 mm thick closed cell neoprene strip, or 8 mm thick open cellular rubber reinforced with solid rubber particles bonded to cellulose, minimum 28 mm (1-1/2 inch) wide, with self-sticking permanent adhesive on one face, lengths as required.

.13 Joint Treatment Materials: Provide joint compound and accessory materials in accordance with ASTM C475 and as follows:

.1 Joint Tape:

.1 Interior Gypsum Board: Paper.

.2 Exterior Gypsum Soffit Board: Fibreglass mesh tape.

.3 Tile Backing Panels: As recommended by panel manufacturer.

.2 Joint Compound for Interior Gypsum Board: Vinyl based, non-asbestos, low dusting type compatible with other compounds applied on previous or for successive coats, and as follows:

.1 Pre-filling: Setting type taping compound.

.2 Embedding and First Coat: Drying type compound.

.3 Fill Coat: Drying type compound.

.4 Finish Coat: Drying type, sandable topping compound.

.5 Skim Coat: Drying type, sandable topping compound.

.6 Acceptable Materials:

.1 CertainTeed Dust Away

.2 CGC Dust Control
.3 Joint Compound for Tile Backing Panels:
   .1 Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.

.4 Joint Compound for Interior Mould Resistant Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   .1 Pre-filling: Setting type joint compound.
   .2 Embedding and First Coat: Setting type joint compound.
   .3 Fill Coat: Setting type, sandable topping compound.

2.6 ACCESSORIES – LEAD LINED / BACKED BOARD

.1 Lead Batten Strips (Ribbon Lead): lead strips, free from any imperfections, conforming to ASTM B29, having same thickness as lead lining on gypsum board. Provide 50 mm wide lead strips for straight runs and 75 mm wide lead strips at corners.

.2 Lead Strips: lead strips, free from any imperfections, conforming to ASTM B29, having same thickness as lead lining on gypsum board, with length and width to suit construction and application (e.g., sufficient width to fully wrap stud framing at door and window openings.

.3 Fastener Protection: The following two options are acceptable.
   .1 Lead Disc to meet shielding requirements, conforming to ASTM B29, for installation over gypsum board fastener heads.
   .2 Lead Tabs to meet shielding requirements, conforming to ASTM B29, for installation over gypsum board fastener heads.

.4 Lead Lining at Electrical Boxes, Medical Gas Penetrations, and Similar Conditions shall be shielded with the same thickness of lead as the lead walls.

.5 Fasteners: Type S-6 or greater fine thread rust resistant self-drilling screws complying with ASTM C1002, not less than 30 mm length, for applying lead-lined gypsum board to light gauge metal framing having thickness of 0.84 to 2.84 mm thick.

2.7 FINISHES

.1 Joint Treatment: All exposed gypsum board for this Contract shall receive AWCI Level 4 finish.

.2 Painting: in accordance with Section 09 91 00 – Painting.

2.8 FABRICATION – LEAD LINED / BACKED BOARDS

.1 Lead lining / backing: Un-pierced 99.99% pure lead, permanently laminated to gypsum board in factory using manufacturer’s recommended resilient latex adhesive and tested laminating process.

Part 3 Execution

3.1 EXAMINATION
1. Verify that all items that are to be enclosed by Work of this Section have been permanently installed, inspected and approved.

2. Inspect framing and other substrates; verify that they are in proper condition to receive the work of this Section.

### 3.2 PREPARATION

1. During the operation of Work of this Section protect existing work against damage by exercise of reasonable care and precautions. Repair all existing materials that are damaged by Work of this Section to match original profiles and finishes. Existing materials repaired shall be removed and replaced with new Work to match existing.

### 3.3 ERECTION

1. Install and finish gypsum board in accordance with ASTM C840, except where specified otherwise.

2. Install work level to tolerance of 1:1200.

3. Frame with furring channels perimeter of openings for access panels, light fixtures, diffusers, grilles.

4. Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

5. Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

6. Furr openings and around built-in equipment, cabinets, 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 and joists spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.

9. Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

10. Install expansion and control joints as required.

### 3.4 APPLICATION

1. Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

2. Apply single or double layer gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

   1. Single-Layer Application:
      
      1. Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.

      2. Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
.3 Apply gypsum board to concrete and concrete block surfaces, where indicated, using laminating adhesive. Apply double layer where indicated.
   .1 Comply with gypsum board manufacturer's recommendations.
   .2 Brace or fasten gypsum board until fastening adhesive has set.
   .3 Mechanically fasten gypsum board at top and bottom of each sheet.

.4 Apply mould-resistant gypsum board adjacent to slop sinks and janitors’ closets, in kitchen areas, concessions, serveries, and washrooms (except where tile backer boards are used at tile locations). Apply mould-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.5 Apply 13 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

.6 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.7 Install gypsum board with face side out.

.8 Do not install damaged or damp boards.

.9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.5 INSTALLATION – GENERAL

.1 Gypsum wall sheathing board shall be mechanically fastened to supporting assembly independent of insulation, with joints either backed or taped and filled.

.2 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

.3 Install casing beads around perimeter of suspended ceilings.

.4 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.5 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.6 Construct control and expansion joints of preformed units or two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.7 Provide continuous polyethylene dust barrier behind and across control joints.

.8 Expansion and Control Joints:
   .1 Locate control joints where indicated or as required, and at changes in substrate construction, at approximate 10 m spacing on long corridor runs, and at approximate 15 m spacing on ceilings.
.2 Install control joints straight and true.
.3 Construct expansion joints at building expansion and construction joints. Provide continuous dust barrier.
.4 Install expansion joint straight and true.

.9 Splice corners and intersections together and secure to each member with 3 screws.
.10 Install access doors to electrical and mechanical fixtures specified in respective sections.
.1 Rigidly secure frames to furring or framing systems.
.11 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
.12 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:

.1 Levels of finish:
.1 Level 1 for non-exposed areas: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable and for plenum areas above ceilings, in attics or in concealed spaces.
.2 Level 2: Embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable and when gypsum is used as a substrate for tile.
.3 Level 3: Embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges and where areas are to receive a heavy coating of textured material.
.4 Level 4 for all exposed areas: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges and where light textures or wall coverings are to be applied.

.13 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
.14 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
.15 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
.16 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
.17 Mix joint compound slightly thinner than for joint taping.
.18 Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.

.19 Remove ridges by light sanding or wiping with damp cloth.

.20 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

3.6 INSTALLATION – LEAD LINED / BACKED GYPSUM BOARD WALLS

.1 Apply gypsum board vertically with long edges parallel to supports and lead lining facing supports and lead lining facing supports. Provide blocking at end joints. Install vertical lead batten strips minimum 1-1/2 inches wide and same height and thickness as gypsum board lead lining to inside of face channel of stud supports and blocking where all vertical joints, inside and outside corners occur. Secure lead batten strips to studs, lead shielding thickness, full partition height, as specified. No untrained persons or trades to occupy room or work area during any lead material installation in accordance with Occupational Health and Safety requirements.

.1 Installation shall be in accordance with the following:

.1 Manufacturer’s recommendations, installation instructions, and MSDS.

.2 Item 1.3 X-RAY RADIATION SHIELDING CRITERIA NCRP of this Section.

.3 Owner’s radiation shielding report.

.4 Ontario Building Code 2012 and Amendments.

.5 Fire Rated partition designs where required.

.2 Lead lined / backed gypsum board shall be installed vertically with long edges parallel to supports.

.3 Studs shall be a minimum of 0.912 mm nominal base steel thickness and set a maximum of 400 mm on centre for vertical installation of lead lined / backed gypsum board.

.2 Secure gypsum board to supports with fasteners spaced as recommended by board manufacturer. Drive fasteners slightly below exposed surface and shield with either lead discs, tabs or internally with 50 mm wide batten strips, or 32 mm long steel screws when appropriate governing laws and regulations permit and assigned Owner’s representative approves prior to beginning the installation.

.1 All penetrations in lead lined /walls must be properly backed with sheet lead of same thickness as on surrounding wall with proper overlaps as required.

.2 Where outlet boxes, junction boxes, ducts, conduit and similar items prevent the use of shields, provide lead sleeves or lead lining or backing as required with proper overlaps. Provide lead lining, sleeves, shields and other protections of equivalent thickness of lead as used in the wall partition shielding system that each penetration occurs in.

.3 No other trades or persons to occupy room or work area during lead installation.
.4 All lead trimmings must be recycled or disposed of in compliance with applicable health, safety and environmental codes and regulations. Properly and completely clean up and disposal or recycle all sheet lead trimmings and debris. Never dispose of any lead or lead containing materials in general trash or refuse.

.5 Refer to general installation requirements in this Section for joint treatment and preparation for taping and finishing.

3.7 TOLERANCES

.1 Maximum variation for gypsum board partitions and ceilings from true flatness: 3 mm per 3 m, noncumulative.

3.8 CERTIFICATION

.1 Upon completion of installation, manufacturer shall supply a certificate of compliance stating that all materials have been produced in accordance with this specification. Contractor / Installer shall supply a certificate of compliance stating that all materials have been installed in accordance with this specification, the project plans and the Owner’s shielding report for this particular project.

3.9 TESTING

.1 After X-RAY equipment has been installed and placed in operating condition and prior to use, radiation shielding will be tested at owner’s expense for compliance with governing laws and regulations, and Owner’s policies and procedures.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 General Requirements.

.1 Leave Work area clean at end of each day.

.2 Daily clean work areas by disposing of debris, scraps, and lead. Vacuum surfaces with HEPA (High Efficiency Particulate Air filter) vacuum in compliance with U.S.A. OSHA Standard 1926.62.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements.

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Vacuum surfaces with HEPA (High Efficiency Particulate Air filter) vacuum in compliance with U.S.A. OSHA Standard 1926.62.

.3 Manage and dispose of demolition and construction waste materials in accordance with Government of Canada, Province of Ontario and City of Toronto regulations, by-laws and ordinances that address any aspect of the Work of this Section.

3.11 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.
3.12 BOARD SCHEDULE

.1 Use Fire Rated Type ‘X’ or Type ‘C’ board options at fire rated wall and ceiling assemblies as required to meet requirements of Ontario Building Code 2012 and Amendments; refer to Drawings for rated assembly locations and required ratings; review existing door labels that identify fire rated requirements.

.2 Install board as indicated, and as follows:

.1 Mould Resistant Board: for general use; use unless otherwise specified.

.2 Cementitious Backer Board (cement board): wet rooms, plumbing walls, adjacent to sinks, tubs and wash areas.

.3 Standard Board and plastic sheeting: for temporary hoarding installations.

.4 Lead Lined / Backed Board (Regular and Fire Rated as required):

.1 Operatories:

.1 Mould Resistant Board 16 mm thick, with 1 mm thick (12.2 kg/m²) 99.99% pure commercial sheet lead (to ASTM B29) factory-laminated to back of board.

.2 PAN Room:

.1 Mould Resistant Board, 16 mm thick, with 2.0 mm thick (24.4 kg/m²) 99.99% pure commercial sheet lead (to ASTM B29) factory-laminated to back of board.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

.1  Section 09 21 16 – Gypsum Board Assemblies.

1.2  REFERENCES

.1  American Iron and Steel Institute (AISI)


.2  ASTM International (ASTM).


.2  ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.


.6  ASTM C645-14e1, Standard Specification for Nonstructural Steel Framing Members.


.8  ASTM C841-03(2013), Standard Specification for Installation of Interior Lathing and Furring.

.9  ASTM C1002-14, Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.


.12  ASTM E413-16, Classification for Rating Sound Insulation.


1.3 SYSTEM DESCRIPTION

.1 Non-load bearing steel framing includes non-load bearing steel studs framing members for interior framing systems (e.g., partition walls, framed bulkheads, furring, etc.) as well as interior suspension systems (e.g., supports for ceilings, suspended bulkheads, etc.).

1.4 DESIGN CRITERIA

.1 Conform to the requirements of fire-rated assemblies indicated that have been tested in accordance with CAN/ULC S101 and provide fire resistance rating of 4 minutes, or as otherwise indicated on Drawings.

.2 For Interior non-load bearing studs, select appropriate size of stud from ASTM C754.

.3 A non-load bearing (non-structural) member is defined as a member in a steel-framed system which is limited to transverse (out-of-plane) load of not more than 480 PA, a superimposed axial load, exclusive of sheathing materials, of not more than 1460 N/m, or a superimposed axial load of not more than 890 N.

.4 A load bearing (structural) stud may be used in a non-load bearing application; however, non-load bearing members (studs or track) may never be used in a load bearing (axial and/or wind loading) applications.

.5 Track for interior walls and non-load bearing walls located at exterior walls or at locations where abuse-resistant gypsum board is scheduled to be installed shall have a thickness of not less than the thickness of the corresponding studs and shall have not less than 31.8 mm flanges.

.6 Connections between light steel framing members shall be by sheet metal screws, welding or crimping.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meetings one week prior to beginning work of this Section in accordance with Division 01 – General Requirements to:

.1 Verify project requirements.
.2 Review installation conditions.
.3 Coordinate with other building trades.
.4 Review manufacturer's instructions.
1.6 **ACTION AND INFORMATIONAL SUBMITTALS**

- **.1** Submittals shall comply Division 01 – General Requirements.

- **.2** Product Data:
  - **.1** For each product specified and indicated, submit manufacturer’s technical data sheets, standard details, and printed installation instructions.
  - **.3** Submit the following:
    - **.1** Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
    - **.2** Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 **QUALITY ASSURANCE**

- **.1** Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-loadbearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to CAN/ULS S101.

- **.2** STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.

- **.3** Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

- **.4** Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**Part 2**

**Products**

2.1 **MATERIALS**

- **.1** General:
  - **.1** Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.
  - **.2** Steel for non-load bearing members shall have metallic coatings that conform to ASTM A792M with minimum metallic coating weight (mass) of AZM150. Alternative coatings shall be permitted to be used if proven to have equivalent corrosion protection.
  - **.3** Framing members shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) for conditions indicated.

- **.2** Suspension System Components:
  - **.1** Structural Classification: rated for heavy-duty load carrying performance in accordance with ASTM C635.
.2 Tie wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 1.21 mm minimum diameter, or of a material and size having equivalent corrosion resistance and strength.

.3 Hanger attachments to concrete:

.1 Anchors shall be fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times design load indicated in ASTM C635, Table 1, Direct Hung as determined by testing by an independent testing agency according to ASTM E488.

.4 Hanger wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 3.77 mm minimum diameter, or of a material and size having equivalent corrosion resistance and strength.

.5 Carrying Channels:

.1 Channels shall conform to ASTM C754 and shall be cold-formed from steel with minimum 228 MPa yield strength and 1.37 mm base steel thickness.

.2 Channels shall have a hot dip metallic coating that conforms to ASTM A792M with minimum metallic coating weight (mass) of AZM150.

.3 Carrying channels shall have minimum 12.7 mm wide flanges and minimum depth of 38 mm.

.6 Furring Members:

.1 Furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.53 mm and with minimum 12.7 mm wide flanges and a depth of 19.1 mm.

.2 Steel stud shall be manufactured from steel in accordance with the AISI North America Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base Steel thickness of 0.53 mm and a depth indicated on drawings.

.3 Hat-shaped, rigid furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.53 mm and minimum depth of 22.2 mm. The minimum width of furring attachment flanges shall be 12.7 mm.

.4 Resilient furring channels are designed to reduce sounds transmission and shall have a minimum depth of 12.7 mm.

.3 Steel Framing for Framed Assemblies:

.1 Steel studs and track shall be manufactured from steel in accordance with the AISI North America Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base Steel thickness of 0.53 mm and a depth as indicated on drawings. Knock-out service holes at 460 mm centres.
Steel Studs at Openings:

1. Use 0.91 mm heavy weight framing to support fire rated door frames.
2. Single jamb studs: 0.91 mm thick single jamb studs.
3. 42-inch (1067 mm) or wider door openings: double steel studs, 1.146 mm thick, (0.0451 inch), 50 mm flange width (2-inch), stiffening lip 0.625 inch (16 mm), yield strength 33 ksi.

Slip-Type Head Joints:

1. Deflection Track: steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and width to accommodate depth of studs.
   
   Available products: subject to compliance with requirements, Products that may be incorporated into the work include:
   
   1. Brady Construction Innovations, SliptrackSystems
   2. Dietrich Metal Framing, SLP-TRK.

2. Double-Track System: track complying with AISI North American Standard for Cold-Formed Steel Framing (Product Data), inside track with 50.8 mm deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction fit inside track.

Flat Strap and Backing Plate:

1. Sheet steel for blocking and bracing in length and width indicated.
2. Minimum base steel thickness: 0.53 mm.

Channel bridging shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.53 mm with minimum 12.7 mm wide flanges and depth of 19.1 mm.

Hat-shaped, rigid furring channels: shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.53 mm and minimum depth of 22.2 mm. The minimum width of furring attachment flanges shall be 12.7 mm.

Resilient furring channels: designed to reduce sound transmission, minimum depth 12.7 mm.

Furring channels: comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.53 mm and with minimum 12.7 mm wide flanges and a depth of 19.1 mm.

1. Furring Brackets: adjustable, corrugated-edge of steel sheet with minimum base steel thickness of 0.79 mm.
2. Tie wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 1.21 mm minimum diameter, or of material and size having equivalent corrosion resistance and strength.
Insulation strip: adhesive-backed, closed-cell vinyl foam gasket strips that allow fastener penetration without foam displacement, 3.2 mm thick, in width to suit steel stud size.

Fasteners for Metal Framing: of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates in accordance with ASTM C1002.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

.1 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Suspended Assemblies: coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

.2 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION – GENERAL

.1 Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.

.1 Gypsum Board Assemblies: also comply with requirements in ASTM C840 that apply to framing installation.

.2 Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

.3 Install bracing at terminations in assemblies.

.4 Do not bridge building control and expansion joints with non-loadbearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLATION – SUSPENSION SYSTEMS

.1 Install suspension system components in sizes and spacing indicated on drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

.2 Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
.3 Suspend hangers from building structure as follows:
  .1 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
  .1 Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.

.2 Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
  .1 Size supplemental suspension members and hangers to support ceiling loads within a deflection limit of L/360 under applied load, and L/240 under combined dead load and applied load.

.3 Wire Hangers: secure by looping and wire tying, either directly to structure or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.

.4 Do not attach hangers to steel roof deck unless otherwise approved.
.5 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
.6 Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
.7 Do not connect or suspend steel framing from ducts, pipes, or conduit.

.4 For fire-resistance-rated assemblies, wire tie furring channels to supports.

.5 Installation Tolerances: install suspension systems that are level to within 3 mm in 3.6 m measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLATION – FRAMED ASSEMBLIES

.1 Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

.2 Install studs so flanges within framing system point in same direction.
  .1 Space studs as follows:
    .1 Single-layer application: 406 mm on centre, unless otherwise indicated.
    .2 Multilayer application: 406 mm on centre, unless otherwise indicated.
    .3 Tile backing panels: 406 mm on centre, unless otherwise indicated.
    .4 Abuse-resistant panels: 406 mm on centre, unless otherwise indicated.

.3 Install track at floors and overhead supports. Install insulation strips at all floor tracks. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  .1 Slip-Type Head Joints: where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies due to deflection of structure.
.2 Door Openings: screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
.1 Install double studs at each jamb.
.2 Install anti-spread bracing approximately 48-inches (1219 mm) from the bottom of the partition wall framing between the door frame double stud and the adjacent stud on both sides of the frame.
.3 Secure studs to top and bottom tracks by soldering or with rivets (not screws).
.4 Install cripple studs at head adjacent to each jamb stud, with a minimum 13 mm clearance from jamb stud to allow for installation of control joint in finished assembly.
.3 Other Framed Openings: frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
.4 Fire-Resistance-Rated Partitions: install framing to comply with fire-resistance rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

.4 Direct Furring:
.1 Screw to framing.
.2 Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 610 mm on centre.

.5 Installation Tolerance: install each framing member so fastening surfaces vary not more than 3 mm from the plane formed by faces of adjacent framing.

3.6 CLEANING
.1 Progress Cleaning: clean in accordance with Division 01 General Requirements. Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.
.3 Manage and dispose of demolition and construction waste materials in accordance with Government of Canada, Province of Ontario and City of Toronto regulations, by-laws and ordinances that address any aspect of the Work of this Section.

3.7 PROTECTION
.1 Protect installed products and components from damage during construction.
.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION
1 GENERAL

1.1 Section Includes

.1 Design, labour, Products, equipment and services necessary for acoustical ceilings Work in accordance with the Contract Documents.

1.2 References

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinciron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM C423, Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.


.4 ASTM C636, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

.5 ASTM C645, Specification for Non-Load Bearing (Axial) Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board.

.6 ASTM E1264, Classification for Acoustical Ceiling Products.

1.3 Design Requirements

.1 Design ceiling suspension systems in accordance with ASTM C636 and manufacturer's printed directions.

.2 Design tile ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Acoustic panel system is not designed to carry the weight of electrical equipment.

.3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 Design tile suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures. Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.

.5 Design subframing as necessary to accommodate, to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

1.4 Submittals

.1 Shop drawings:

.1 Submit shop drawings indicating:
.1 Suspension system layout including hangers and supports for acoustic tile system.

.2 Acoustic panel system including suspension system, hangers, supports and panel sizes and locations.

.3 Conditions at abutting, intersecting, and penetrating construction.

.4 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads and other items that pierce the ceiling plane.

.2 Samples:

.1 Submit following samples:

.1 One full-size sample of each type of tile panels to be used.

.2 One of each type of suspension system members.

.3 Certificates:

.1 Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.5 Quality Assurance

.1 Mock-up:

.1 Construct one 3 m² mock-up for each type of ceiling system incorporating typical light fixture and other typical mechanical and electrical fixtures. All fixtures must be mounted/installed independent of the ceiling tile system.

.2 Test the adequacy of the suspension system to support the fixtures without deflection of ceiling or failure of hanging wire anchorage. Supply copy of Test Results to Consultant.

.3 Change materials and installation methods if tests indicate proposed system is inadequate and re-test as necessary until system approved.

.4 Give early notice to Consultant and Mechanical and Electrical Trades and cooperate with them in selecting suitable location for sample ceiling and timing of installation and test.

.5 Do not commence general installation work until sample ceiling approved, then install ceiling to conform with approved samples.

.6 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.6 Site Conditions

.1 Do not install the Work of this Section until:

.1 Mechanical and electrical Work above the ceiling is complete.
.2 Relative humidity is below 80%.

.3 Ventilation is adequate to remove excess moisture.

.4 Areas are closed and protected against weather, and maintained at no less than 10°C.

.2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and after installation.

1.7 Maintenance

.1 Submit extra acoustic ceilings amounting to 2% of gross ceiling area, allowing proportionately for each pattern and type specified to nearest full carton. Submit Products which are part of same production run as installed Products. Store maintenance Products as directed by Consultant.

1.8 Delivery, Storage, and Handling

.1 Transport, handle and store material in manner to prevent warp, twist, damage to panel edges and surfaces in accordance with Manufacturer's recommendations.

.2 Any warped and/or damaged panels and trim shall be rejected and be replaced by new, straight, undamaged and acceptable material at no cost to Owner.

.3 Bent, twisted or otherwise damaged Tee grid suspension components shall not be used under any circumstances. Replace such damaged items with new undamaged material at no additional cost to Owner.

.4 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.

.5 All packaged material shall be delivered in original manufacturers wrappers and containers with labels and seals intact. All cartons shall bear U.L. label.

2 PRODUCTS

2.1 Materials


.2 Main carrying channels: ASTM C645; Channels formed from galvanized steel sheet, 38 x 19 mm cold rolled.

.3 Subframing: ASTM C645; Channels formed from galvanized steel sheet, dimensions and spans as required.

.4 Hangers: 2.6 mm minimum diameter, galvanized steel wire.

.5 Tie wire: 1.6 mm minimum diameter, soft annealed galvanized steel wire.
.6 Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.

.7 Wall mouldings and accessories, including but not limited to, corner caps, edge mouldings, panel hold over clip, metal closures, and trim. Finish and colour: same as main tees.

.8 Exposed main, cross tees, and relocatable cross tees: ASTM C635, 38 mm high steel, bulb tee design double steel web, rectangular single spans without exceeding a deflection of 1/360 of the span. Splices to be integral and reversible; cross tee interlocking into main tee. Colour and finish: Manufacturer's standard white.

.9 Acoustic tile – Ultima Vector, White, as manufactured by Armstrong Ceiling Tiles or approved alternative by CGC Inc. or Certainteed Ceilings Canada.

.10 Wall mouldings: To match acoustical ceiling suspension system.

3 EXECUTION

3.1 Examination

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 Suspension System

.1 Coordinate locations and openings of mechanical and electrical services support, and penetration through the acoustical ceilings. Coordinate field conditions, clearances, measurements, and mechanical and electrical services testing and commissioning, above the acoustical ceilings.

.2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.

.3 Install acoustical ceiling systems in accordance with manufacturer's written instructions, reviewed shop drawings, and ASTM C636, listed in order of precedence.

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

.5 Install additional hangers at lighting fixture and air distribution ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.
.6 Install acoustical ceiling suspension system to a tolerance of 1:1200 of span and 0.4 mm maximum between adjacent metal members. Tolerances are not cumulative. Refer to Electrical Contract Drawings for fixture layout.

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

.8 Install edge moulding at intersection of ceiling and vertical surfaces.

.9 Centre acoustical ceiling suspension systems on room axis; install equal border pieces. Install hangers onto the ends of main tee runners at not more than 150 mm from ends of runners, adjacent and perpendicular to walls.

.10 Support the suspension system independently of walls, columns, ducts, pipes and conduits.

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

3.3 Acoustic Lay-In Tiles

.1 Install acoustic tile in grid system openings supported by bottom flanges of members. Provide special shapes and sizes to provide a complete installation by cutting tile to fit into openings. Fit tile moderately tight between upright legs of members.

.2 Carefully cut and trim acoustic tiles to accommodate items piercing the finished ceiling plane.

.3 Remove and replace acoustic tiles with broken edges, or damaged, marked, discoloured, soiled, or stained faces.

3.4 Adjustments and Cleaning

.1 Clean soiled or discoloured surfaces of exposed work on completion of work.

.2 Replace components which are visibly damaged, marred or uncleanable.
Part 1 General

1.1 RELATED SECTIONS

.1 Section 02 41 20 – Selective Interior Demolition.
.2 Section 07 92 00 – Sealants

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
   .1 ASTM F710-11, Standard Practice for Preparing Concrete Floors to Receiving Resilient Flooring.
   .2 ASTM F1516 13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended).
   .3 ASTM F1700-13a, Standard Specification for Solid Vinyl Floor Tile.
   .4 ASTM F1861-08(2012)e1, Standard Specification for Resilient Wall Base.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
   .1 Material Safety Data Sheets (MSDS).

.3 South Coast Air Quality Management District (SCAQMD), California State
   .1 SCAQMD Rule 1113-13, Architectural Coatings.
   .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.4 Underwriters Laboratories of Canada (ULC):
   .1 CAN/ULC S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 SUBMITTALS

.1 Provide product data in accordance with Division 01 General Requirements.
   .1 Submit one copy of product data for each type of product specified.

.2 Provide samples in accordance with Division 01 General Requirements.
   .1 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base, nosing, feature strips, treads, edge strips.

.3 Closeout Submittals:
   .1 Provide manufacturer’s printed recommendations for general maintenance, including cleaning instructions and guidelines for use of waxes and other protective coatings and appearance enhancers in accordance with Division 01 General Requirements.
   .2 Submit warranties.
1.4 EXTRA MATERIALS

.1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Division 01 General Requirements.

.2 Provide minimum 5 m² of each colour, pattern and type flooring material required for project for maintenance use. Provide full unopened boxes only.

.3 Extra materials one piece and from same production run as installed materials.

.4 Clearly identify each roll of sheet flooring and each container of adhesive.

.5 Deliver to Consultant upon completion of the work of this section.

.6 Store where directed by Consultant.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: Provide products that meet requirements of ULC S102.2 as applicable for required flame spread ratings; labelled and listed by Underwriters Laboratories of Canada (ULC), or another testing and inspecting agency acceptable to authorities having jurisdiction.

.2 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Installer shall be Trade Qualified for their specific flooring products by the National Floor Covering Association.

.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of three (3) years documented experience in the installation of resilient sheet flooring and seams in accordance with manufacturer’s training or certification program:

.3 Source Limitations: Obtain each type, colour, and pattern of flooring or accessories specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials in good conditions to the jobsite in the manufacturer’s original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

.3 Store materials in a clean, dry, enclosed space off the ground, and protect from the weather and from extremes of heat and cold. Protect adhesive from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.
.4 Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer’s recommended bond and moisture tests.

1.7 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

1.8 WARRANTIES

.1 Provide Manufacturer’s Commercial 20-Year Warranty.
.2 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2-years from date of Substantial Performance.

Part 2 Products

2.1 RESILIENT PLANK FLOORING

.1 F1: Resilient vinyl plank flooring from ISO 14001 and 9001 certified plant with the following minimum physical properties and performance characteristics:
   .1 Complies with requirements for ASTM F1700 Standard Specification for Solid Vinyl Floor Tile, Class III, Type B.
   .2 FloorScore® certified.
   .3 Heterogeneous printed vinyl floor covering with a non-woven glass fiber polyurethane reinforced wear layer.
   .4 Wear layer thickness: 20 mil (≥0.5 mm).
   .5 Overall thickness: .125" (≥3.2 mm)
   .6 Finish: UV-cured polyurethane.
   .7 ASTM F925: meets or exceeds.
   .8 ASTM F1515: exceeds.
   .9 Static load limit, to ASTM F970: 250 psi.
   .10 ASTM E648: 0.45 watts/cm^2 or greater, Class I.
   .11 Basis-of-Design Colour: Similar to Armstrong, Natural Living, Golden Grove D2418.

2.2 RESILIENT SHEET FLOORING

.1 F2: Resilient vinyl sheet flooring from ISO 14001 and 9001 certified plant with the following minimum physical properties and performance characteristics:
   .1 Complies with requirements for ASTM F1913, designed for commercial areas with very heavy traffic and heavy light industrial areas, to EN ISO 10874, EN 685 Classifications 34 and 43.
.2 Heterogeneous printed vinyl floor covering with a clear PVC wear layer, fibreglass-reinforced integral print layer, and PVC back incorporating polyurethane reinforcement.

.3 Clear PVC Wear Layer: 0.7 mm thick.

.4 Backing: 1.30 mm thick.

.5 Overall Thickness: 2 mm.

.6 Meet requirements of abrasion Group T, as defined in EN 649 and Binder Content Type 1 as defined in EN ISO 10582.

.7 Shall not accumulate static charges above 2kV and is classified as ‘antistatic’ when tested to EN1815.

.8 Slip Resistance: tested to EN 13893 for slip resistance and classified DS, making it suitable for use in areas that are predominantly dry. When tested to DIN 51130 the product shall be classified as R10.

.9 Light Fastness: tested to ISO 105-BO2 Method 3, having a pass to ≥6.

.10 Basis-of-Design Colour: Similar to Polyflor Expona Flow PUR, by Polyflor Ltd., Concrete - Warm Concrete 9855.

2.3 RESILIENT BASE

.1 B2: Cove base, to ASTM F1861, minimum 1200 mm and 100 mm high x 3 mm thick, including pre-moulded end stops and external corners; FloorScore certified.

.2 Basis-of-Design Colour: Similar to Johnsonite, Mandalay, 50 White.

2.4 FLEXIBLE CORNER GUARDS

.1 CG-1: Flexible Vinyl Corner Guards, similar to Johnsonite VBG-XX-A, colour to match wall as closely as possible.

2.5 ACCESSORIES

.1 TR-1 and TR-2 Transition strip reducers, similar to Johnsonite, SSR-XX-B, colour to match floor.

.2 TR-3 Transition Strip T Moulding, similar to Johnsonite, CD--XXX-C, colour to match floor.

.3 Cap Strips: extruded aluminum, smooth, mill finish, with lip to extend under coved floor finish and profile to cover top of coved sheet flooring.

.4 Cove Support Strip:

.1 Pre-Fabricated Cove Base: fabricated from same materials and dye lots as resilient flooring, in maximum practical lengths, with 38 mm x 38 mm formed aluminum reinforcing bonded to back of base material.

.1 Riser: 100 mm.

.2 Toe: 85 mm.

.3 Basis-of-Design: similar to FlashCove Prefabricated Bases Inc.

.5 External corner protectors: extruded aluminum, smooth, mill finish, type recommended by flooring manufacturer.
.6 Sub-floor filler and leveler 2-part latex-type filler requiring no water, as recommended by flooring manufacturer for use with their product.

.7 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.

.8 Welding rod: designed to weld seams of sheet flooring, as recommended by flooring manufacturer, colour as directed by Consultant.

.9 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed commercial floor preparation and installation instructions, technical datasheets, and specifications.

3.2 SITE VERIFICATION OF CONDITIONS

.1 Ensure concrete floors have maximum 2.5% moisture content, exhibit normal alkalinity and no carbonization or dusting.

.2 Ensure concrete floors are clean, smooth, and flat to plus or minus 3 mm over 3 meters.

3.3 PREPARATION

.1 Prepare substrates according to manufacturer’s printed instructions as required to meet warranty requirements.

.1 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

.2 Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

.3 Mechanically remove contamination on the substrate that may cause damage to the resilient athletic flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.

.4 Prepare Substrates according to ASTM F710 including the following:

.1 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

.2 Perform anhydrous calcium chloride test, ASTM F1869. Results shall not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24-hours.
- or -

Perform relative humidity test using in situ probes, ASTM F2170. Shall not exceed 80%.

.3 A pH test for alkalinity shall be conducted. Results shall range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation shall not proceed until the problem has been corrected.

.4 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

.2 Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

.3 Floor covering shall not be installed over expansion joints.

.4 Do not install resilient products until they are same temperature as the space where they are to be installed. Move resilient products and installation materials into spaces where they will be installed at least 48-hours in advance of installation.

.5 Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.4 INSTALLATION: GENERAL

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72-hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Cut flooring around fixed objects.

.4 Install feature strips and floor markings where indicated. Fit joints tightly.

.5 Install flooring in pan type floor access covers. Maintain floor pattern.

.6 Continue flooring over areas which will be under built-in furniture.

.7 Continue flooring through areas to receive movable type partitions and lockers without interrupting floor pattern.

.8 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.9 Install metal edge strips at unprotected or exposed edges where flooring terminates.
3.5 INSTALLATION: FLOOR TILE

.1 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.

.2 Install flooring to ashlar/staggered pattern with continuous joints flowing with direction of mottle.

.3 As installation progresses and after installation is complete, roll resilient tile flooring in accordance with manufacturer’s instructions.

3.6 INSTALLATION: SHEET FLOORING

.1 Lay flooring with seams parallel to building line or as indicated on drawings to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.2 Run sheets in direction of traffic, double cut sheet joints, and heat weld according to manufacturer's printed instructions.

.3 Provide seams in strict accordance with manufacturer’s recommendations. Heat weld seams with welding rod when heat welded seams are a permitted option by manufacturer.

.4 As installation progresses and after installation is complete, roll resilient sheet flooring in accordance with manufacturer’s instructions.

3.7 INSTALLATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.

.7 Cope internal corners. Use pre-moulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

.9 Install toeless type base before installation of carpet on floors.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.8 INSTALLATION: ACCESSORIES

.1 Install feature strips and floor markings where indicated. Fit joints tightly.

.2 Install metal edge strips at unprotected and exposed edges where flooring terminates.
3.3 Install cove support strips continuously where sheet flooring is to be coved to vertical surfaces.

3.4 Install cap strips continuously to cover top edge of coved sheet flooring. Mitre corners. Top of cap strip shall be straight and level to variation of plus or minus 3 mm over 3 m straight edge.

3.9 FIELD QUALITY CONTROL

3.9.1 Manufacturer's Field Services:

   .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.10 CLEANING

3.10.1 Progress Cleaning: clean in accordance with Division 01 General Requirements.

   .1 Leave Work area clean at end of each day.

   .2 Immediately clean adjacent surfaces that have been soiled and leave work in a neat, clean condition. Remove excess materials and droppings using recommended cleaners and solvents.

3.10.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements.

   .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

   .3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

3.11 PROTECTION

3.11.1 Protect installed products and components from damage during construction.

3.11.2 Repair damage to adjacent materials caused by Work of this Section.

3.11.3 Protect new floors from time of final set of adhesive until final inspection.

3.11.4 Prohibit traffic on floor for 48-hours after installation.

END OF SECTION
Part 1  General

1.1  RELATED SECTIONS

.1  Section 08 11 13 – Metal Doors and Frames.
.2  Section 09 25 00 – Gypsum Board Assemblies.
.3  Other technical sections as indicated.

1.2  REFERENCES

.1  American Society of Testing and Materials (ASTM)
   .1  ASTM D16-12, Standard Terminology for Paint, Related Coatings, Materials, and Applications.
.2  CSA International (CSA)
   .1  CSA Z317.13-12, Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.
.3  Department of Justice Canada (Jus)
   .1  Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.4  Environmental Protection Agency (EPA)
.5  Green Seal
   .1  Green Seal Standards GS-11, Paint.
   .2  Green Seal Standard GC-03, Anti-Corrosive Paints.
.6  Health Canada/Workplace Hazardous Materials Information System (WHMIS)
   .1  Material Safety Data Sheets (MSDS).
.7  Master Painters Institute (MPI)
   .1  MPI Architectural Painting Specifications Manual.
.9  South Coast Air Quality Management District (SCAQMD), California State
   .1  SCAQMD Rule 1113-04, Architectural Coatings.
.10  Society for Protective Coatings (SSPC)
1.3 **ADMINISTRATIVE REQUIREMENTS**

.1 **Pre-Installation Meeting:**
   .1 Convene pre-installation meeting to Division 01 General Requirements one week prior to beginning work of this Section and on-site installations in accordance with Construction Progress Schedule.
   .1 Verify project requirements.
   .2 Review installation and substrate conditions.
   .3 Coordination with other building trades.
   .4 Review manufacturer's installation instructions and warranty requirements.

.2 **Scheduling**
   .1 Submit work schedule for various stages of painting to Consultant for review. Submit schedule minimum of 48-hours in advance of proposed operations.
   .2 Obtain written authorization from Consultant for changes in work schedule.
   .3 Schedule painting operations to prevent disruption of and by other trades.
   .4 Schedule painting operations to prevent disruption of occupants.

.3 **Health and Safety:**
   .1 Do construction occupational health and safety in accordance with Health and Safety Requirements.

1.4 **SUBMITTALS**

.1 Submit product data in accordance with Division 01 General Requirements.
   .1 Submit product data and instructions for each paint and coating product to be used.
   .2 Submit product data for the use and application of paint thinner.
   .3 For each product incorporated into the Work, submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS). Indicate VOCs during application and curing.

.2 Submit samples in accordance with Division 01 General Requirements.
   .1 Submit full range colour sample chips to indicate where colour availability is restricted.
   .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating, and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
      .1 3 mm plate steel for finishes over metal surfaces.
      .2 13 mm birch plywood for finishes over wood surfaces.
      .3 50 mm brick for finishes over brick masonry surfaces.
.4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.

.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.3 Closeout Submittals: submit maintenance data for incorporation into Operating and Maintenance Manual, and include following:

.1 Product name, type, and use.
.2 Manufacturer's product number.
.3 Colour code numbers.
.4 MPI Environmentally Friendly classification system rating.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's printed installation and application instructions.

1.5 QUALITY ASSURANCE

.1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.

.2 Journeymen: qualified journeymen who have Tradesman Qualification Certificate of Proficiency engaged in painting work.

.3 Apprentices: working under direct supervision of qualified Journeyman in accordance with trade regulations.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Pack, ship, handle and unload materials in accordance with Division 01 General Requirements, and manufacturer's written instructions.

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.
.2 Store materials and supplies away from heat generating devices.
.3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:
   .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
   .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
   .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
   .1 Ventilate enclosed spaces.
   .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
   .3 Provide continuous ventilation for seven days after completion of application of paint.
   .4 Coordinate use of existing ventilation system with Consultant and ensure its operation during and after application of paint as required.
   .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
   .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
   .1 Unless pre-approved written approval by Consultant and product manufacturer, perform no painting when:
      .1 Ambient air and substrate temperatures are below 10 degrees C.
      .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
      .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, rainy, misty, raining or snowing at site.

Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

Perform painting work when maximum moisture content of the substrate is below:

- 12% for concrete and masonry (clay and concrete brick/block).
- 15% for wood.
- 12% for plaster and gypsum board.
- Allow new concrete and masonry to cure minimum of 28 days.

Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

Test concrete, masonry and plaster surfaces for alkalinity as required.

Surface and Environmental Conditions:

- Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

- Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

- Apply paint when previous coat of paint is dry or adequately cured.

Additional Interior Application Requirements:

- Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

- Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

Provide paint materials for paint systems from single manufacturer.
.3 Conform to latest MPI requirements for all painting work including preparation and priming.

.4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.

.5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

.6 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
   .1 Use low-odour, low-VOC coating options to the extent possible.
   .2 Use water-based coatings where available unless otherwise specified.
   .3 Non-flammable.
   .4 Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.
   .5 Manufactured without compounds that contribute to smog in the lower atmosphere.
   .6 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.7 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.8 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.9 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
   .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
   .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

.10 Recycled water-borne surface coatings shall not contain:
   .1 Lead in excess of 600.0 ppm weight/weight total solids.
   .2 Mercury in excess of 50.0 ppm weight/weight total product.
   .3 Cadmium in excess of 1.0 ppm weight/weight total product.
   .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
   .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.
2.2 COLOURS

.1 Colours: Submit colour samples for initial selection to Consultant and confirm selections with Consultant prior to ordering products. Assume 3 colours and 2 accent colours for project.

.2 Second coat in three-coat system to be tinted slightly lighter colour than topcoat to show visible difference between coats.

.3 Minimum coating system: MPI Premium Grade: primer, intermediate coat, topcoat(s) as required to achieve uniform, opaque finish.

2.3 MIXING AND TINTING

.1 Unless otherwise specified or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in contained prior to and during application to ensure break-up of lumps, completed dispersion of settled pigment, and colour and gloss uniformity.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Gloss @ 60 degrees</th>
<th>Sheen @ 85 degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 - Matte (flat)</td>
<td>Max. 5</td>
<td>Max. 10</td>
</tr>
<tr>
<td>G2 - Velvet-Like</td>
<td>Max.10</td>
<td>10 to 35</td>
</tr>
<tr>
<td>G3 - Eggshell</td>
<td>10 to 25</td>
<td>10 to 35</td>
</tr>
<tr>
<td>G4 - Satin-Like</td>
<td>20 to 35</td>
<td>min. 35</td>
</tr>
<tr>
<td>G5 - Semi-Gloss</td>
<td>35 to 70</td>
<td></td>
</tr>
<tr>
<td>G6 - Gloss</td>
<td>70 to 85</td>
<td></td>
</tr>
<tr>
<td>G7 - High Gloss</td>
<td>More than 85</td>
<td></td>
</tr>
</tbody>
</table>

.2 Gloss level ratings of painted surfaces as indicated or as otherwise direct by Consultant.

2.5 INTERIOR PAINTING

.1 Unless otherwise specified, interior painting work shall be in accordance with MPI Multi-Coat Premium Grade finish requirements; i.e., all applications include primer, intermediate and finish coats as a minimum.

.2 Refer to Drawings for finish guidance, and refer questions regarding finish selection to Consultant prior to ordering and applying finishes.
.3 Structural Steel and Metal Fabrications: exposed columns, beams, joists, and miscellaneous metal:
   .1 INT 5.1K Epoxy-modified latex finish.
   .2 For Repainting Work: RIN 5.1J Epoxy-modified latex finish.

.4 Galvanized Metal:
   .1 INT 5.3E Epoxy finish (over vinyl wash primer and epoxy primer).
   .2 For Repainting Work: RIN 5.3D Epoxy finish.

.5 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, and textured finishes:

2.6 SOURCE QUALITY CONTROL
   .1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility that has been accredited by Standards Council of Canada.
      .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
      .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
      .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

Part 3 Execution

3.1 MANUFACTURER’S INSTRUCTIONS
   .1 Compliance: comply with manufacturers’ printed recommendations and specifications, including product technical bulletins, handling, storage, preparation and application instructions, and technical datasheets.

3.2 GENERAL
   .1 Perform preparation and operations for painting in accordance with MPI - Architectural Painting Specifications Manual, Premium Grade.
   .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD-0</td>
<td>Sound Surface (may include visual (aesthetic) defects that do not affect film’s protective properties).</td>
</tr>
<tr>
<td>DSD-1</td>
<td>Slightly Deteriorated Surface (may show fading; gloss reduction, slight surface contamination, minor pin holes, scratches, etc.) / Minor cosmetic defects (runs, sags, etc.).</td>
</tr>
<tr>
<td>DSD-2</td>
<td>Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, staining, etc.).</td>
</tr>
<tr>
<td>DSD-3</td>
<td>Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).</td>
</tr>
<tr>
<td>DSD-4</td>
<td>Substrate Damage (repair or replacement of surface required by others).</td>
</tr>
</tbody>
</table>

.4 Prior to commencement of repainting work, thoroughly examine (and test as required) all interior conditions and surfaces scheduled to be repainted and report in writing to the Consultant any conditions or surfaces that adversely affect work of this section.

.5 The degree of surface deterioration (DSD) shall be assessed as follows:

.6 Correct defects DSD-0 through DSD-4 as required, ready to be painted. Coordinate with other trades as needed.

3.4 PREPARATION – REPAINTING

.1 Prepare all interior surfaces for repainting in accordance with MPI Repainting Manual requirements.

.2 Sand, clean, dry, etch, neutralize and/or test all surfaces under adequate illumination, ventilation and temperature requirements.
3. Remove and securely store all miscellaneous hardware and surface fittings and fastenings (e.g. electrical plates, mechanical louvers, door and window hardware (e.g. hinges, knobs, locks, trim, frame stops), removable labels, washroom accessories, light fixture trim, etc. from wall and ceiling surfaces, doors and frames, prior to repainting and replace upon completion. Carefully clean and replace all such items upon completion of repainting work in each area. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes). Doors shall be removed before repainting to paint bottom and top edges and then re-hung.

4. Protect all adjacent interior surfaces and areas, including rating and instruction labels on doors, frames, equipment, piping, etc., from repainting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

3.5 PREPARATION – NEW WORK

1. Protection:
   1. Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
   2. Protect items that are permanently attached such as Fire Labels on doors and frames.
   3. Protect factory finished products and equipment.
   4. Protect passing pedestrians, building occupants, and general public in and about the building.

2. Surface Preparation:
   1. Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
   2. Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
   3. Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Consultant.

3. Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual requirements and coating manufacturer's recommendations. Refer to MPI Manual in regard to specific requirements and as follows:
   1. Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean clothes or compressed air.
   2. Wash surfaces with a biodegradable detergent and bleach where applicable 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.
4. Allow surfaces to drain completely and allow to dry thoroughly.
5. Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
6. Use trigger operated spray nozzles for water hoses.
7. Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  1. Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  2. Apply wood filler to nail holes and cracks.
  3. Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets, and corners to be painted by brushing with clean brushes or vacuum cleaning.
.8 Prepare existing brick surfaces to be painted to firm substrate by removing dirt, dust, loose, un-adhered and flaking paint, oil, grease and other foreign substances in accordance with MPI requirements. Remove all products from surfaces, pockets, and corners to be painted by brushing with clean brushes or vacuum cleaning.
.9 Touch up of shop primers with primer as specified.
.10 Do not apply paint until prepared surfaces have been accepted by Consultant.

3.6 APPLICATION

.1 Method of application shall be as approved by Consultant and AVRSB Project Manager. Apply paint by brush, roller, air sprayer or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
.2 Brush and Roller Application:
  1. Apply paint in uniform layer using brush and/or roller type suitable for application.
  2. Work paint into cracks, crevices, and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers, or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers, or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags, brush marks from finished work, and repaint.

.3 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices, and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum period as recommended by manufacturer.

.7 Sand and dust between each coat to provide an anchor for next coat and to remove defects in previous coat (runs, sags, etc.) visible from a distance up to 1000 mm (39”).

.8 To avoid air entrapment in applied coats, apply materials in accordance with manufacturer’s spread rates and application requirements.

.9 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.10 Finish inside of cupboards and cabinets as specified for outside surfaces.

.11 Finish closets and alcoves as specified for adjoining rooms.

.12 Finish top, bottom, edges, and cut-outs of doors after fitting as specified for door surfaces.
3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.8 FIELD QUALITY CONTROL

.1 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Owner.

.2 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

.4 Painted interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Consultant:

.1 brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
.2 evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
.3 damage due to touching before paint is sufficiently dry or any other contributory cause.
.4 damage due to application on moist surfaces or caused by inadequate protection from the weather.
.5 damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

Painted interior surfaces shall be considered unacceptable if any of the following are evident under final lighting source conditions:
.1 visible defects are evident on vertical surfaces when viewed at 90 degrees to the surface from a distance of 1000 mm (39”).
.2 visible defects are evident on horizontal surfaces when viewed at 45 degrees to the surface from a distance of 1000 mm (39”).
.3 visible defects are evident on ceiling surfaces when viewed at 45 degrees to the surface.
.4 when the final coat on any surface exhibits a lack of uniformity of sheen across full surface area.

Painted surfaces rejected by the Consultant shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.9 CLEANING
.1 Progress Cleaning: clean in accordance with Division 01 General Requirements. Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.
.3 Manage and dispose of demolition and construction waste materials in accordance with Government of Canada, Province of Ontario and City of Toronto regulations, by-laws and ordinances that address any aspect of the Work of this Section.

3.10 PROTECTION
.1 Protect installed products and components from damage during construction.
.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION