

APPENDIX C

SPECIFICATIONS

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END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Read and conform to the Contract Documents including Division 1 requirements and documents referred to in this Section.

1.2. SPECIFICATION FORMAT

- 1.2.1. Specifications are addressed to the Contractor. Specifications are not intended as detailed description of installation methods but serve to indicate particular requirements in completing the Work.
- 1.2.2. Where the Contract Documents do not provide sufficient information for complete installation of item, then as supplement, comply with manufacturer's written instructions for quality of work.
- 1.2.3. Portions of the Specifications are written in short form. Therefore, it shall be understood that where item of the Work is stated in heading followed by material, equipment, component, or operation, words "shall be", "shall consist of" or similar words or phrases are implied which denote supply, fabricate and supply, install, provide or commission of such materials, equipment or operations for component of the Work designated by heading.
- 1.2.4. Where items in the Contract Documents are referred to in singular, provide as many as required to complete the Work. Words used in one gender only shall mean females as well as males and conversely.
- 1.2.5. Drawings, Lists or Schedules of Items are intended to show scope and arrangement of the Work. For location of item described refer to such Drawings, Lists or Schedules unless location stipulated in the Specifications.

1.3. DEFINITIONS

Refer to the Definitions set out in the Contract Documents between the Owner and Contractor as amended by the Owner.

1.4. DISCREPANCIES/CONFLICTS/OMISSIONS

- 1.4.1. If discrepancies or conflicts in, or omissions from the Drawings, the Specifications or other Contract Documents are suspected, or if there is doubt as to meaning or intent thereof, notify the Consultant at once. Where there is conflict between the Contract Documents, the most stringent requirement shall prevail.
- 1.4.2. The Drawings, Specifications and other Contract Documents are intended to be in compliance with federal, provincial and municipal laws, by-laws, regulations and other requirements of authorities having jurisdiction. Perform work in conformity with such requirements. If discrepancies, conflicts or omissions are suspected, notify the Consultant at once.
- 1.4.3. Comply with the Consultant's written instructions or explanations.
- 1.4.4. Promptly and not later than within 5 Working Days of becoming aware of circumstances which may require a change in the Work or other directions, give written notice to the Consultant outlining such circumstances and request written directions. Do not work in affected area, or that would prevent the Consultant from properly assessing situation or evaluating change, without its prior written approval. The Consultant will act promptly to give the Contractor directions so the Work is not unreasonably delayed.

1.5. DESCRIPTION OF THE WORK

- 1.5.1. The Work of this Contract includes furnishing labour, materials, equipment, services and other related expenses to complete the Work specified under the Contract Documents.
- 1.5.2. Term "NIC" means Work of this Project which is not being performed or provided under this Contract; term means "Not In this Contract" or "Not a Part of the Work to be Performed or Provided by Contractor".
- 1.5.3. "NIC" work may be specified or indicated on the Drawings as an aid to the Contractor in scheduling amount of time and materials necessary for completion of the Contract.

1.6. SCHEDULING

- 1.6.1. Base sequence and scheduling of construction on maintaining continuous operation and access to the Work during construction.
- 1.6.2. Phase construction as described in this Section. Notify the Owner in writing 7 Days prior to beginning work in an occupied area. The Owner will accommodate request within 7 Days of the notification. Coordination with the Owner at the Place of the Work is crucial. Submit a progress schedule before commencement of the Work. Coordinate any suggested changes to schedule with the Owner. Ensure schedule includes adequate time for Product delivery and Shop Drawing preparation, review and resubmission.
- 1.6.3. Allow for un-scheduled interruption to schedule of the Work and suspend parts of the Work affected to permit the Owner to relocate furniture and equipment from the Place of the Work, into finished spaces. The Owner will coordinate this interruption.

1.7. COMPLETION DEADLINES

- 1.7.1. Phase and schedule the Work to meet deadlines originally committed to by the Contractor.

1.8. INCLEMENT WEATHER AND COLD WEATHER WORK

- 1.8.1. Take precautions during inclement weather and provide adequate protection.
- 1.8.2. Continue the Work, including winter months, if applicable, until the Work is completed and accepted by the Consultant.
- 1.8.3. Inclement weather or extra work caused thereby shall not be considered valid reason for additional payment or delay in satisfactory conclusion of the Work.

1.9. OWNER OCCUPANCY

- 1.9.1. The Owner reserves right to occupy and use portions of premises, whether the Work is partially or entirely completed, or whether completed on schedule or not, provided such occupancy does not interfere with the Contractor's continuing Work.
- 1.9.2. Partial occupancy or installation of equipment by the Owner does not imply acceptance of the Work in whole, or in part, nor shall it imply acknowledgment that terms of the Contract are fulfilled.

1.10. PLACE OF THE WORK

- 1.10.1. Confine extent of construction activities to area indicated on the Drawings as the Place of the Work and/or within area defined by property lines. Confine all equipment, materials, debris, offices, storage sheds and storage areas to within the boundaries of the scope of the Work unless additional spaces are approved by the Owner.

- 1.10.2. The Contractor has complete and exclusive use of the Place of the Work for performance of the Work. Assume responsibility for premises assigned, for performance of the Work.
- 1.10.3. Should the Contractor require that boundaries of the Place of the Work be temporarily extended, obtain approval of the Consultant.
- 1.10.4. Certain restrictions are specified as to use by the Contractor of various portions of the Place of the Work. Become familiar with these restrictions and establish work plan to accommodate these restrictions. No claims for extra costs due to such restrictions will be considered by the Owner.
- 1.10.5. Assume responsibility for care, custody and control of property which is assigned for performance of the Work. Assume responsibility for and Make Good damage to existing property attributable to performance of the Work.

1.11. DEMOLITION, SECURITY AND ACCESS

- 1.11.1. Coordinate demolition times, security requirements and access with the Owner.

1.12. EXISTING AREAS AND WORK OF OTHER CONTRACTORS

- 1.12.1. Commencement of parts of the Work in existing areas and in areas provided by Other Contractors, will be deemed to signify the Contractor's acknowledgment and acceptance of those parts of the Work.
- 1.12.2. Immediately report defects, which affect quality and performance of the Work, in writing to the Consultant.
- 1.12.3. Existing premises will remain occupied during the Work. Execute the Work to cause minimum interference with activities in existing premises and maintain maximum safety to occupants. Take reasonable measures to minimize and control noise, dirt and dust during the Work.
- 1.12.4. Before entering existing premises to carry out the Work or to obstruct or take out of use any area of existing premises, or to cause any other interference, request meeting with the Consultant in order to reach agreement as to time and length of time you may interfere, possess, obstruct or remove from use any such area or services.
- 1.12.5. Maintain temporary entrances to work area including enclosed hoardings as required. Maintain access to existing service entrance(s) at all times, including ready access for fuel oil trucks and delivery vehicles.

1.13. SIGNS, ADVERTISING AND PUBLICATIONS

- 1.13.1. Do not erect or display devices, signs or advertisements of labour, materials or services provided to the Work. Signs relative to fire, danger and safety are exempted from this requirement.
- 1.13.2. Do not consent to advertising of the Work, of any kind, without the Owner's and the Consultant's written approval. Do not consent to mention of the Work in any advertising or articles in any publication relating to the Work without approval of copy and written permission from the Owner and the Consultant.

1.14. PROCEDURE AND SUPPLY OF CRITICAL MATERIALS

- 1.14.1. Supply Products in ample time to be installed into the Work together with templates, measurements and other information required for placement.

1.15. RESTRICTIONS

- 1.15.1. The Work shall be confined to the Site limits indicated on the Drawings and/or within area defined by property lines. Work on the municipal property shall be carried out under regulations of respective municipality and Authorities Having Jurisdiction including without any limitations any associated fees, permits, insurance or bonding required.

1.15.2. Bring following restrictions to attention of workers on the Work and enforce them:

1.15.2.1. Restrict construction personnel to the Place of the Work and necessary access routes to it. Restrict non-construction personnel from the Site, except for the Contractor-authorized visitors.

1.16. SECURITY REGULATIONS

1.16.1. Execute the Work in accordance with following security requirements and regulations.

1.16.2. Ensure only necessary tools and equipment are brought to each work area where access by public is possible. Keep constant check on these items and, at end of each work shift, bring all tools and equipment to storage room as directed.

1.16.3. Construction work is permitted weekdays between 8:00am – 5:00pm or other times as permitted by the Owner.

1.16.4. The Owner will provide security escort for the Work in locations it deems necessary.

1.16.5. The Owner may issue suitable keys to the Contractor, where possible. The Contractor shall sign receipt for keys issued and shall be responsible for admittance of its authorized personnel only to areas for which keys provide access. Return keys to the Owner immediately upon request.

1.16.6. Direct enquiries regarding security regulations to the Owner, who will advise the Contractor of any additional requirements.

1.16.7. Execute the Work taking into consideration movement of occupants.

1.18. EXISTING SITE SERVICES

1.18.1. Before commencing the Work, establish location and extent of existing services in area of the Work and notify the Consultant of findings.

1.18.2. If disruption of services which affects operation of existing building is necessary, give a minimum of 5 Working Days' notice to the Consultant and the Owner. Provide temporary services and obtain prior acceptance from the Consultant and the Owner with regard to timing and methods for providing temporary services.

1.18.3. Submit schedule to and obtain approval from the Consultant for each proposed shut-down of active service or facility. Adhere to approved schedule and provide notice to affected parties. Disconnect and relocate public utilities encountered in connection with the Work with minimum disturbance to occupants, their activities, pedestrian, vehicular traffic, public and private property. Issue notices, arrange for or provide services involving:

1.18.4.1. water pipes.

1.18.4.2. sanitary and storm sewers.

1.18.4.3. telephone conduits and cables.

1.18.4.4. electrical conduits and cables.

1.18.4.5. other similar items.

1.18.4. Should any piping, cables, or similar services be encountered during work of this Contract that are not known from the Owner's and utility companies' records, notify the Consultant and do not proceed with removal or cutting until directed in writing.

1.19. SITE WORK

- 1.19.1. Restore existing paving, sidewalks, curbs and landscaping damaged during construction. Provide paving, walks, curbs and landscaping to match existing conditions where not otherwise shown.
- 1.19.2. Provide sod to replace damaged grass and maintain it until it has rooted properly.

1.20. NO SMOKING POLICY

- 1.20.1. Cooperate, respect and comply with Smoke Free Workplace policy requirements of the Place of the Work. This policy applies to everyone who visits and works on this Project.
- 1.20.2. Smoking is prohibited inside the building and within 7.5 meters from all building entries, operable windows and air intakes.

1.21. ACOUSTIC PARTITIONS/CEILINGS

- 1.21.1. Partitions and/or ceilings with sound attenuation insulation are designated as “Acoustic Partitions and Ceilings”. Provide sound rated partitions and ceilings in locations indicated to meet required minimum Sound Transmission Class (STC) ratings. If not stated otherwise, STC rating is 47.
- 1.21.2. Coordinate work of various Subcontractors to avoid “short circuiting” of the STC rating for “Acoustic Partitions and Ceilings”. Carefully locate and treat ducts, grilles, diffusers, electrical outlets, boxes and other similar mechanical and electrical devices. Where electrical boxes are situated back-to-back serving each side of the partitions, locate them at least 250 mm (10") apart laterally and if interconnected, use flexible connections.
- 1.21.3. Ensure to seal around cutouts for lights, cabinets, pipes, ducts, electrical boxes and other similar items. Avoid back-to-back penetrations of the diaphragm, flanking paths and door/ borrowed light openings. Refer to Section 09 21 16 – Gypsum Board for additional requirements

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

1.1.1. Read and conform to the Contract Documents including the Articles of Agreement, the General Conditions and Supplementary Conditions, Amendments to CCDC2-2020 Stipulated Price Contract 2020.

1.1.2. Comply with Division 1 requirements and documents referred to in this Section.

1.2. REFERENCES

1.2.1. Abbreviations and Acronyms:

1.2.1.1. CCO: Contemplated Change Order.

1.2.1.2. CD: Change Directive.

1.2.1.3. CO: Change Order.

1.2.1.4. HST: Harmonized Sales Tax.

1.3. CASH ALLOWANCES

1.3.1. The purpose of the Cash Allowances, if any, in the Bid Form is to cover the cost of extra work approved by the Region at its sole discretion, if required.

1.3.2. If the Region requests that a Cash Allowance be expended, the Contractor shall consult with the Consultant and/or Region in the selection of the Products, services and/or vendors required to carry out the work under the Cash Allowance, and shall obtain the Region's approval for the selection of Products, services and/or vendor(s) in relation to the Cash Allowance.

1.3.3. If required by the Region, the Contractor shall obtain bids from a minimum of three vendors in relation to a Cash Allowance item, and submit the bids received to the Region and/or Consultant for approval.

1.3.4. The Contractor shall submit, with the application for payment, an invoice showing the date of purchase, the vendor from which the purchase was made, the date of delivery of the Product or service, and the price, including delivery to the Site and all applicable taxes.

1.3.5. Cash Allowance payments will only be made with the written authorization of the Region, and shall not include any markups whatsoever. The Contractor shall have no claim on any unused portion of any Cash Allowance item.

1.3.6. Extend to the Owner refunds, trade and quantity discounts which may be received in purchasing under Cash Allowances, except cash discounts for prompt payment.

1.3.7. In submitting final adjustments of Cash Allowances, include duplicate, summary statements and copies of receipted invoices substantiating purchases under Cash Allowances.

1.3.8. Cash Allowance No. 1: Inspection and Testing
Mechanical system Air Balancing Report as specified in Section 23 05 93 Testing, Adjusting, Balancing, Commissioning

1.3.8.1. Include the sum of: \$5,000

1.3.9. Cash Allowance No. 2: Door Hardware
Supply and install finish door hardware as specified in Section 08 71 00 Finish Hardware.

1.3.9.1. Include the sum of: \$20,000

1.4 [NOT USED]

1.5. CASH FLOW SCHEDULE

1.5.1. Prior to commencement of the Work, submit a detailed cash flow projection schedule indicating anticipated billings on a month-by-month basis for duration of the Work, including timing of holdback release.

1.5.2. Update cash flow schedule monthly, recording cumulative as well as monthly totals.

1.6. PROGRESS BILLING BREAKDOWN

1.6.1. Prior to commencement of the Work, submit a detailed progress billing breakdown and obtain approval of the Consultant.

1.6.2. Progress billing breakdown shall include itemized values, (each excluding HST), applied against each of following:

1.6.2.1. mobilization and start-up.

1.6.2.2. general site expenses.

1.6.2.3. Cash Allowance amount.

1.6.2.4. each Section of Specifications (Divisions 2 - 49 inclusive).

1.6.2.5. as-built Drawings broken down by Architectural, Structural, Mechanical and Electrical disciplines.

1.6.2.6. Project closeout, comprising separate sums for:

1.6.2.6.1. manuals.

1.6.2.6.2. maintenance materials.

1.6.2.6.3. commissioning and training/demonstration for Owner's staff.

1.7. CHANGES IN THE WORK DUE TO A SUPPLEMENTAL INSTRUCTION

1.7.1. Supplemental Instruction does not normally include any change in the Contract Price nor in the Contract Time. The Contractor shall formally notify the Consultant in writing within 10 Days that Supplemental Instruction requires an amendment in the Contract Price and/or the Contract Time. If satisfied, the Consultant will issue a CCO for processing, or if notification has not been received within 10 Days, it is understood that there are no anticipated changes in the Contract Price and the Contract Time.

1.8. CONTRACT MODIFICATION PROCEDURES

1.8.1. Conform to GC 6 - Changes in the Work in the General Conditions of the Contract.

1.8.2. Further to GC 6 – Changes in the Work, promptly and not later than 10 Working Days after becoming aware of circumstances which may require a change in the Work or other directions, give written notice to the Consultant outlining such circumstances and requesting proposed change. Do no work in affected area, or that would prevent the Consultant from properly evaluating circumstances and proposed change, without obtaining written approval. The Consultant will act promptly to give the Contractor directions so Work is not unreasonably delayed.

- 1.8.3. Advise the Consultant in writing of any contradictions, discrepancies, omissions or errors discovered or revealed. Do not proceed before obtaining clarifications and directions from the Consultant in writing. Failure to follow this shall result in the Contractor assuming full responsibility for resulting circumstances and costs.

1.9. CHANGE ORDER AND CHANGE DIRECTIVE

- 1.9.1. Conform to GC 6.2 – Change Order and GC 6.3 – Change Directive in the General Conditions of the Contract.
- 1.9.2. Any variation in the Contract involving a change in total amount of the Contract Price or in Contract Schedule shall be initiated through the Consultant in form of a CCO describing work proposed under variation and requesting a quotation from Contractor.
- 1.9.3. Three copies of CCOs or CDs will be issued to Contractor. Additional copies of these documents, including referenced Drawings and Schedules, shall be provided by the Contractor.
- 1.9.4. Immediately inform all relevant Subcontractors and Suppliers of the proposed change.
- 1.9.5. Upon receipt of a CCO by the Contractor and where specifically directed by the Consultant, suspend all work affected by the proposed change until a CO is issued, or until CCO is cancelled.
- 1.9.6. Upon receipt of a CD, begin the work described therein as soon as possible and prepare a quotation for the work.
- 1.9.7. Return 1 copy of the CCO or CD with a quotation for the work.
- 1.9.8. Include all work described in the CCO and all other work caused, however incidental it may be, by the proposed change. Once the CO is issued by the Owner, no further claims for extra costs or time extensions will be accepted.
- 1.9.9. If quotation received is unacceptable, the Consultant will reject quotation and request revised quotation from the Contractor.
- 1.9.10. When the Consultant deems quotation acceptable, it will prepare a CO.
- 1.9.11. Value of changes in work shall be determined and processed in accordance with the General Conditions.

1.10. APPLICATION FOR PROGRESS PAYMENTS AND PROGRESS PAYMENTS

- 1.10.1. Conform to Part 5 – Payment and GC 10.1 – Taxes and Duties in the General Conditions of the Contract.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Read and conform to the Contract Documents including Division 1 requirements and documents referred to in this Section.

1.2. REFERENCES

- 1.2.1. Abbreviations and Acronyms:
- 1.2.1.1. SDS: Safety Data Sheets.
 - 1.2.1.2. OHSA: Occupational Health and Safety Act.
 - 1.2.1.3. WHMIS: Workplace Hazardous Materials Information System.

1.3. PROJECT COORDINATION

- 1.3.1. Study the Contract Documents to determine extent of Work required by each Specification section and upon which Work of other sections depend and coordinate scope and extent of Work to be performed by each trade. Neither organization of the Specifications into Divisions and 3-part section format nor arrangements of the Drawings, schedules and Drawings shall affect in any way the Contractor's control in, or diminish its responsibility for, dividing the Work or establishing each Subcontractor's scope of Work. Claims for additional compensation arising from disputes between Subcontractors due to lack of coordination by the Contractor will not be considered.
- 1.3.2. Coordinate Work of each section as required for satisfactory and expeditious completion of the Work. Take field dimensions required. Take into account existing installations to assure best arrangements of components in available space. Consult before commencing the Work in critical locations. Fabricate and erect the Work to suit field dimensions and field conditions.
- 1.3.3. Provide forms, templates, anchors, sleeves, inserts and accessories or other components required to be fixed to or inserted in the Work. As applicable, set them in place or instruct related Specification sections as to their location.
- 1.3.4. Pay cost of extra Work if necessary to maintain the agreed upon schedule.
- 1.3.5. Coordinate Work of all Subcontractors including construction sequence, schedule and interfacing of all Work. Coordinate Work as required to incorporate metric modular components. Coordinate the work of each Subcontractor as required for satisfactory and expeditious completion of the Work. Ensure components to be built in are supplied in time with setting Drawings and other related information. Fabricate and erect the Work to suit field dimensions and field conditions.
- 1.3.6. Ensure the Contract Documents are fully coordinated with respect to architectural, structural, mechanical, electrical and other specialty requirements.
- 1.3.7. Cooperate and coordinate with the Consultant for moving the Owner's equipment into building when the Work or substantial part thereof is ready for use for purpose intended.

1.4. DOCUMENTS ON SITE

- 1.4.1. Maintain in good condition and order on Site: One copy of Addenda, proposed changes in the Work, Change Orders, test reports, manufacturer's installation and application instructions, progress photographs, as-built Drawings, approved progress schedules, minutes of site meetings, and other modifications to the Contract Documents.

1.5. OWNER, CONSULTANT AND CONTRACTOR (OCC) MEETINGS

- 1.5.1. Purpose: To review policy, financial status, and schedule.
- 1.5.2. Period: Every 2 weeks on a mutually acceptable schedule.
- 1.5.3. Attendees:
 - 1.5.3.1. Owner.
 - 1.5.3.2. Consultant(s).
 - 1.5.3.3. Contractor.
- 1.5.4. Chair: Consultant.
- 1.5.5. The Consultant shall prepare minutes recording decisions, comments, instructions required and a report on Schedule. The Consultant will distribute minutes to each participant within 5 Working Days.

1.6. SITE COORDINATION AND PROGRESS MEETINGS

- 1.6.1. Refer also to General Conditions of the Contract.
- 1.6.2. Conduct site meetings at regular intervals (every 2 weeks), to identify and resolve construction coordination items, record minutes including significant proceedings and decisions and identify "action by" parties; and reproduce and distribute to meeting participants, copies of minutes within 3 Working Days after each meeting. The Consultant also reserves right to call additional special emergency site meetings on short notice without any cost to the Owner.
- 1.6.3. Attendees:
 - 1.6.3.1. The Contractor's project manager and site superintendent.
 - 1.6.3.2. Mechanical and electrical Subcontractors.
 - 1.6.3.3. Subcontractors invited by Contractor.
 - 1.6.3.4. The Owner and/or the Consultant(s).
- 1.6.4. Chair: Contractor.
- 1.6.5. Include following:
 - 1.6.5.1. Prepare agenda for meetings.
 - 1.6.5.2. Distribute written notice of each meeting minimum 7 Days in advance of meeting date, stating time and place, to persons whose presence is required.
 - 1.6.5.3. Make physical arrangements for meetings.
 - 1.6.5.4. Record minutes and attendees; include significant proceedings and decisions.
 - 1.6.5.5. Reproduce and distribute copies of minutes after each meeting to parties attending meeting, to parties affected by decisions made at meeting and to the Consultant.
 - 1.6.5.6. Ensure representatives of the Contractor, the Contractor's consultants, Subcontractors and Suppliers attending meetings are qualified and authorized to act on behalf of entity each represents.
 - 1.6.5.7. Ensure relative information is available to allow meetings to be conducted efficiently.

- 1.6.5.8. Consultant may attend meetings to ascertain whether the Work is consistent with the Contract Documents.
- 1.6.5.9. Construction Progress Schedule may be reviewed to ensure rapid and efficient completion of Work in accordance with the requirements of the Contract Documents. Keep Consultant informed of progress, of delays and of potential delays during all stages of Work.
- 1.6.5.10. Review, approval or correction of minutes of previous meeting.
- 1.6.5.11. Review of Work progress since previous meeting.
- 1.6.5.12. Field observations, problems, conflicts.
- 1.6.5.13. Problems which impede Construction Progress Schedule.
- 1.6.5.14. Review of off-Site fabrication, delivery schedules.
- 1.6.5.15. Review of submittals schedules.
- 1.6.5.16. Corrective measures and procedures to regain projected schedules.
- 1.6.5.17. Quality standards.
- 1.6.5.18. Pending changes and substitutions.
- 1.6.5.19. Other business.

1.7. START-UP MEETING

- 1.7.1. Presided over by the Consultant, after award of the Contract.
- 1.7.2. Attendees:
 - 1.7.2.1. Consultant(s).
 - 1.7.2.2. Contractor.
 - 1.7.2.3. Contractor's superintendent.
 - 1.7.2.4. Subcontractors (mechanical, electrical).
 - 1.7.2.5. Major equipment Suppliers.
 - 1.7.2.6. Others as appropriate.
- 1.7.3. Minimum Agenda:
 - 1.7.3.1. List of major Subcontractors and Suppliers.
- 1.7.3.2. Tentative construction progress schedules.
 - 1.7.3.3. Start date; submission of schedules; long term delivery items.
 - 1.7.3.4. Insurance Certificates, Cash Flow Schedule, Construction Schedule, Shop Drawing submission schedule, bonds including Value Added Taxes, Trade Breakdown including value for Close Out, Work Place and Safety & Insurance Board Clearance Certificate, Project Sign.
 - 1.7.3.5. Critical work sequencing.
 - 1.7.3.6. Major equipment and Product deliveries and priorities.
 - 1.7.3.7. Designation of responsible personnel.

- 1.7.3.8. Building Permit status.
- 1.7.3.9. Procedures for maintaining record documents.
- 1.7.3.10. Use of Premises: Office, keys, work and storage areas; Owner's requirements (storage delivery, path of construction activities, vehicle, by foot, carts, exterior and interior, elevator use, washrooms, bin location).
- 1.7.3.11. Construction facilities, controls, temporary hoarding, dust partitions, parking, hours, noisy work, interruption of services, smoking, cell phone usage and construction aids.
- 1.7.3.12. Construction scheduling (particularly drying time for concrete slabs).
- 1.7.3.13. Temporary utilities.
- 1.7.3.14. Safety and first-aid procedures.
- 1.7.3.15. Security procedures.
- 1.7.3.16. Housekeeping procedures.

1.8. PRE-INSTALLATION TRADE MEETINGS

- 1.8.1. If a Subcontractor requires a meeting prior to starting Work, arrange for such meeting of all parties associated with the Subcontractor trade as designated in the Contract Documents or as requested by the Consultant. Presided over by the Contractor, include the Consultant who may attend, include Subcontractor performing the Work involved, testing company's representative and the Contractor's consultants of applicable discipline. Review the Contract Documents for the Work for which the Subcontractor is responsible and determine complete understanding of requirements and responsibilities relative to the Work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, project staffing, restrictions on areas of concrete placement and other matters affecting construction, to permit compliance with intent of trade under consideration.

1.9. SCHEDULE OF THE WORK

- 1.9.1. Submit a detailed bar chart [critical path] construction schedule with activities itemized to enable the Contractor and the Consultant to monitor progress of the Work.
- 1.9.2. Schedule shall indicate without limitations dates for:
 - 1.9.2.1. erection and dismantling of temporary facilities.
 - 1.9.2.2. submission of Shop Drawings for various divisions of the Work.
 - 1.9.2.3. submission of mechanical and electrical trades coordination and interference Drawings.
 - 1.9.2.4. submission of samples and sample installations.
 - 1.9.2.5. commencement and completion of each major division of the Work, including Work to be done by Subcontractors.
 - 1.9.2.6. critical Work sequencing.
 - 1.9.2.7. drying time for concrete slabs to allow for placement of moisture sensitive floor coverings.
 - 1.9.2.8. major equipment deliveries and priorities.
 - 1.9.2.9. final completion date.
- 1.9.3. Update and resubmit schedule on a monthly basis.

1.10. SHORT TERM SCHEDULE

- 1.10.1. On a bi-weekly basis, provide the Owner with a 2 week short term schedule based on above schedule, indicating important construction activities as the Owner and Consultant may see suitable for the Contract requirements.

1.11. PROGRESS PHOTOGRAPHS

- 1.11.1. Submit progress photographs in digital and hard copy formats, taken by a professional photographer, from date of commencement of the Work until the date of Substantial Performance of the Contract.
- 1.11.2. Submit colour, glossy, 200 mm x 250 mm (8" x 10") photographs in a clear sheet protector suitable for storage in a binder with a white patch in bottom, right corner indicating name of the Contract, compass direction of exposure, subject title, date and time of exposure.
- 1.11.3. Prior to commencement of the Work, submit 10 photographs of the Place of the Work and 6 photographs along the lines forming the perimeter of the Place of the Work.
- 1.11.4. During performance of the Work, submit 12 photographs reproduced in duplicate, each month, taken from different vantage points to illustrate progress of the Work, both exterior and interior.
- 1.11.5. Submit 36 interior photographs when the Work has been certified by the Consultant as substantially performed.

1.12. PERSONNEL APPOINTMENT

- 1.12.1. Appoint a senior member of staff, with full authority to commit the Contractor to methods and schedules for construction, to participate actively in administration and maintenance of detailed construction schedule. Provide necessary information on progress of the Work to enable a status report to be produced every 2 weeks.

1.13. GENERAL REVIEW

- 1.13.1. The Consultant shall conduct periodic field review to review the Work for general conformance with Contract Documents, code and Authorities Having Jurisdiction.
- 1.13.2. Review includes review of Shop Drawings, review of field work and review of reports produced by various inspection and testing agencies.
- 1.13.3. Record each review in manner suitable for submission to the Consultant at completion of the Contract along with inspection and testing reports at site meetings every second week.

1.14. PRODUCT SUBSTITUTION PROPOSALS

- 1.14.1. After award of the Contract, Product substitution proposals will be reviewed in accordance with this Section. The Owner reserve the right to reject proposed substitutions for operational, economic, aesthetic or technical reasons.
- 1.14.2. Submit following for each Product substitution proposal:
- 1.14.2.1. Shop Drawings, including full details.
 - 1.14.2.2. samples.
 - 1.14.2.3. difference in price, if any, in form of certified quotations of both selected and proposed substitutions.
- 1.14.3. Submit the Contractor's written acceptance of use of substituted Products and certification substituted Products:
- 1.14.3.1. will not exceed space requirements allocated for originally specified Products or, if they do,

the Contractor is including with substitution submission, design drawings, to accommodate substituted Product.

- 1.14.3.2. are compatible with and inert to adjacent materials.
- 1.14.3.3. will not affect project schedule due to delays in delivery and installation.
- 1.14.3.4. have been priced to include design adjustments required to accommodate substituted Products, indicate the Owner's acceptance in writing via a Change Order.
- 1.14.4. Proposed substitutions require the Consultant's review and acceptance in writing and, if there is a difference in price, extra or credit requires the Owner's acceptance.

1.15. CERTIFICATES AND TRANSCRIPTS

- 1.15.1. Immediately after receiving notification of award of the Contract, submit Workplace Safety & Insurance Certificate status, transcription of insurances and other certificates and transcripts required by the Contract Documents or the Consultant.

1.16. CONTRACTOR'S PERSONNEL AND SUBCONTRACTORS

- 1.16.1. Submit complete list of the Contractor's Subcontractors with addresses, phone numbers and personnel along with the Contractor's list of personnel.

1.17. SUBMITTAL PROCEDURES

- 1.17.1. Submit to the Consultant, and to Authorities Having Jurisdiction as required, documents to be submitted for review. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of the Contract Time or extra costs and no claim for extension of the Contract Time or increase to the Contract Price by reason of such default will be allowed. Final approval of Authorities Having Jurisdiction, where required, shall be obtained prior to submitting Shop Drawing or other documentation to the Consultant.
- 1.17.2. Prior to submission to the Consultant, the Contractor shall review submittals. Submittals not stamped, signed, dated and identified as to specific Contract will be returned without being examined and shall be considered rejected. Verify field measurements and ensure affected adjacent work are coordinated. Confirm and correlate information pertaining to fabrication processes, quantities, techniques of construction and installation and similar information.

1.18. SHOP DRAWINGS

- 1.18.1. Shop Drawing Schedule: Submit a Shop Drawing schedule.
- 1.18.2. Fabrication: Do not fabricate until Shop Drawings are indicated as "REVIEWED" or "REVIEWED AS NOTED" by the Consultant.
- 1.18.3. The Consultant's Shop Drawing Review:
 - 1.18.3.1. The Consultant's review of Shop Drawings is for sole purpose of ascertaining conformance with general design concept.
 - 1.18.3.2. The Consultant's review does not provide approval of items which remain the Contractor's responsibility.
 - 1.18.3.3. Without limitation, among other things, the Contractor remains responsible for:
 - 1.18.3.3.1. detail design inherent in Shop Drawings.
 - 1.18.3.3.2. errors and omissions in Shop Drawings.

- 1.18.3.3.3. meeting requirements of the Contract Documents.
- 1.18.3.3.4. confirmed and correlated Site dimensions.
- 1.18.3.3.5. information that pertains solely to fabrication processes, techniques of construction and installation.
- 1.18.3.3.6. co-ordination of work of all Subcontractors.
- 1.18.4. Shop Drawing Requirements:
 - 1.18.4.1. Indicate following minimum requirements as applicable:
 - 1.18.4.1.1. plans, sections and details.
 - 1.18.4.1.2. verified Site dimensions.
 - 1.18.4.1.3. materials thicknesses and finishes.
 - 1.18.4.1.4. methods of setting and sealing.
 - 1.18.4.1.5. methods of securing, fastening and anchoring including field connections.
 - 1.18.4.1.6. signed and sealed Shop Drawings and calculations where specifically required herein.
 - 1.18.4.2. Do not make Product substitutions on Shop Drawings without the Consultant's written acceptance in accordance with Product substitution proposal process or they will be rejected. Replace unaccepted Product substitutions and complete the Work in accordance with the Contract Documents.
 - 1.18.4.3. Determine which Shop Drawings the local Building Department will require for its approval and submit 2 final copies of each Shop Drawing to local Building Department. Obtain approval and pay associated charges and fees.
- 1.18.5. Shop Drawing Procedures:
 - 1.18.5.1. The Consultant will provide a Shop Drawing stamp to the Contractor for use on the Work. Shop Drawing stamp remains the Consultant's property and must be returned at conclusion of the Work.
 - 1.18.5.2. Execute following prior to submitting Shop Drawings to the Consultant:
 - 1.18.5.2.1. review, check and mark-up Shop Drawings with comments and revisions and re-direct back to Subcontractor ("REVISE AND RESUBMIT", etc.) in the first instance if required prior to forwarding to the Consultant.
 - 1.18.5.2.2. stamp each Shop Drawing with Consultant's Shop Drawing stamp.
 - 1.18.5.2.3. insert applicable Specification section reference, e.g., "10 28 00" for Section 10 28 00, Washroom Accessories.
 - 1.18.5.2.4. insert next consecutive Shop Drawing number within that section, e.g., "002" for second Drawing within Section 10 28 00.
 - 1.18.5.2.5. insert the Contractor's review date and signature of the Contractor's reviewer.
 - 1.18.5.3. Submit following for the Consultant's review:
 - 1.18.5.3.1. 1 print of each stamped Shop Drawing, to be returned to the Contractor.

- 1.18.5.3.2. 3 prints of each stamped Shop Drawing, not returned to the Contractor.
- 1.18.5.3.3. If catalogue cuts acceptable to the Consultant, submit as many copies of catalogue cuts for review as agreed to. Only 1 set to be returned to the Contractor.
- 1.18.5.4. Reproductions of the Consultant's Contract Documents are not acceptable as Shop Drawings.
- 1.18.5.5. Shop Drawings not conforming to above criteria will be automatically returned without review. Any resulting delays will be the Contractor's responsibility.
- 1.18.5.6. Shop Drawings submitted without specified Professional Engineer design and stamp will be automatically returned without review. Any resulting delays will be the Contractor's responsibility.
- 1.18.5.7. Do not resubmit Shop Drawings indicated as "REVIEWED" and "REVIEWED AS NOTED".
- 1.18.5.8. Resubmit Shop Drawings indicated as "REVISE AND RESUBMIT" with required changes and comments addressed. Insert letter "R" after Shop Drawing number on resubmitted Shop Drawings, re-date and re-sign. Identify revisions from earlier submissions graphically on revised Shop Drawings.
- 1.18.5.9. The Consultant requires 14 Days for review of Shop Drawing from time of the Consultant's receipt to time of the Consultant's return to the Contractor. The Contractor will establish a steady flow of Shop Drawings for review and avoid accumulation of an excessive quantity of Shop Drawings in a single submission.
- 1.18.5.10. Provide Shop Drawings required by the Contract Documents.

1.19. INTERFERENCE DRAWINGS

- 1.19.1. Prepare Drawings indicating relationship of new and existing and/or unforeseen conditions at congested areas prior to commencement of work in area.
- 1.19.2. For congested locations, before commencing installation, prepare Drawings showing relationship of ductwork, conduit, piping, sprinklers, ceiling supports and framing, communication and specialized equipment located within ceiling and shaft spaces.
- 1.19.3. Indicate locations of visible items such as air handling outlets, light fixtures, smoke detectors, sprinkler heads, communication grilles and access panels occurring at these locations.
- 1.19.4. Ensure interference Drawings are initialed by a responsible person of each Subcontractor involved along with the Contractor's signature and submitted to the Consultant for review and record purposes.

1.20. SAMPLES

- 1.20.1. Prior to fabrication or supply of Products, submit samples for the Consultant's review. Remove and discard Products whose samples have not been reviewed and accepted by the Consultant.
- 1.20.2. Deliver samples to the Consultant as directed with charges prepaid and allow for 1 of the samples to be kept by the Consultant.
- 1.20.3. Unless otherwise specified, submit samples in duplicate.
- 1.20.4. Identify each sample with:
 - 1.20.4.1. Contract name and Contract number.
 - 1.20.4.2. date of sample submission.

- 1.20.4.3. component name using the Specification's terminology.
- 1.20.4.4. material (including alloy).
- 1.20.4.5. finish including colour, sheen, texture.
- 1.20.4.6. dimensions including thickness.
- 1.20.5. Exhibit each of the following for each sample:
 - 1.20.5.1. materials.
 - 1.20.5.2. finishes:
 - 1.20.5.2.1. material.
 - 1.20.5.2.2. colour including maximum colour range within each specified colour.
 - 1.20.5.2.3. sheen, tone.
 - 1.20.5.2.4. texture.
 - 1.20.5.2.5. range of blemishes and other markings.
- 1.20.6. Alter, refinish or provide additional samples until they are reviewed and accepted by the Consultant.
- 1.20.7. Fabricate samples using same tools and techniques to be employed in actual installation of the Work.
- 1.20.8. Provide Products in the Work which are identical to accepted samples.
- 1.20.9. Provide samples required by the Contract Documents.

1.21. ACCESS PANELS AND ACCESS DOORS

- 1.21.1. Before commencing installation of mechanical and electrical work, prepare, together with mechanical and electrical Subcontractors, on a set of the Drawings provided for that purpose, a complete lay-out of all access panels and access doors which will be required. Submit these lay-outs for review by the Consultant as specified for Shop Drawings and show exact sizes and locations of access panels and doors. Revisions may be required to lay-out before final review by the Consultant. Allow the Consultant to revise layout or quantity of access doors and panels by relocating related building services a maximum of 2000 mm (6' - 7") at no extra cost to the Owner. Should relocation exceed this measurement then the Contract Price may be adjusted in accordance with provisions for changes in the Contract Documents.
- 1.21.2. Finish access panels and doors to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

1.22. WHMIS REQUIREMENTS

- 1.22.1. Comply with WHMIS in accordance with OHSa requirements.
- 1.22.2. Before commencement of the Work and during full term of the Contract, provide a list with current SDS of all hazardous materials proposed for use on the Contract.
- 1.22.3. In addition to submission of SDS as required under regulations, submit emission reports where available or off-gassing data to help control possible harmful effects to indoor air quality during construction, occupation and including maintenance period.
- 1.22.4. Label hazardous materials used and/or supplied on the Contract in accordance with WHMIS requirements.

- 1.22.5. Provide detailed procedures for safe handling storage and use of hazardous materials. List special precautions and safe clean up and disposal procedures. Conform to the Environmental Protection Act and other requirements of Authorities for disposal and clean up requirements.
- 1.22.6. Obtain from the Owner, where applicable, a list and SDS of hazardous materials that may be handled, stored or used by the Owner's employees and/or Other Contractors retained by the Owner at location where the Work of this Contract will be performed.
- 1.22.7. Ensure those who handle and/or are exposed to or are likely to handle or be exposed to hazardous materials are fully instructed and trained in accordance with WHMIS requirements.

1.23. COLOURS

- 1.23.1. Colour and gloss value to be selected by the Consultant. Obtain direction on colour and gloss value in advance of need. If requested, submit samples for colour and gloss selection. Follow colour schedule provided by the Consultant and use colours and gloss designated.

1.24. RECORD DRAWINGS AND SPECIFICATIONS

- 1.24.1. Keep 1 set of Drawing prints and Specifications on Site for use in maintaining record information. Ensure these Drawings and Specifications are kept on Site at all times available for review by the Owner and/or the Consultant at any given time.
- 1.24.2. Accurately and neatly record deviations from the Contract Documents, including Addenda, Site Instructions and Change Orders, caused by Site conditions.
- 1.24.3. Record information concurrently with construction progress. Do not conceal actual work until required information is recorded.
- 1.24.4. Legibly indicate each item to record actual construction including:
 - 1.24.4.1. Field changes of dimension and details.
 - 1.24.4.2. Details or information not on original Contract Drawings.
- 1.24.5. Catalogue field review reports and cross reference to relevant trade, building area and component. Submit inspection and testing reports in accordance with requirements of the Specifications. Highlight unsatisfactory inspection and testing results with supplementary instructions issued by the Consultant.
- 1.24.6. Identify Drawings as "Project Record Copy", maintained and available for inspection on the Site by the Consultant.
- 1.24.7. Prior to applying for Certificate of Substantial Performance submit record Drawings and Specifications to the Consultant.

1.25. AS-BUILT DRAWINGS

- 1.25.1. Prior to applying for Certification of Substantial Performance, the Consultant will provide the Contractor with electronic set of requested Drawings for as-built purposes.
- 1.25.2. The Contractor is responsible for:
 - 1.25.2.1. maintaining as-built Drawings during progress of work, in complete sets, at the Place of the Work.
 - 1.25.2.2. including additional changes over and above those included in any Addenda, Site Instructions and Change Orders.
 - 1.25.2.3. including accurate locations, depths, sizes and types of underground utilities and concealed services in the as-built Drawings.

- 1.25.2.4. having changes recorded in a manner consistent with the original Drawings using minimum AutoCad software.
- 1.25.2.5. ensuring outline clouds and notations are removed from the Drawings.
- 1.25.2.6. having 1 set as-built Drawing prints submitted to the Consultant for review before final submission.
- 1.25.2.7. incorporating any review comments made by the Consultant.
- 1.25.2.8. resubmitting final reviewed set, in following format:
 - 1.25.2.8.1. 1 set on electronic disk.
 - 1.25.2.8.2. 1 set on reproducible prints (i.e., mylar).
 - 1.25.2.8.3. 1 set of white prints.
- 1.25.3. Refer to Divisions 21, 22, 23, 26, 27 and 28 for supplementary requirements.
- 1.26. OPERATION AND MAINTENANCE INSTRUCTIONS MANUAL**
- 1.26.1. Upon completion of the Work, submit 3 sets of operation and maintenance instructions manual to the Consultant. Include following:
 - 1.26.1.1. data books and literature.
 - 1.26.1.2. maintenance instructions, specifying warnings of any maintenance practice that may damage or disfigure specified Products.
 - 1.26.1.3. operational information on Products, cleaning and lubrication schedules, filters, overhaul and adjustment schedules and similar maintenance information.
 - 1.26.1.4. recommended maintenance Products.
- 1.26.2. Submit instructions in plain language to guide the Owner in proper operation and maintenance of building components.
- 1.26.3. Organize contents into applicable categories of the Work, numbered to match the Specification section numbering system.
- 1.26.4. Bind contents of operation and maintenance instructions manual in 3-ring, hard-covered, vinyl jacketed binders, label spine "OPERATION AND MAINTENANCE INSTRUCTIONS MANUAL" and include following:
 - 1.26.4.1. title sheet, labelled "OPERATION AND MAINTENANCE INSTRUCTIONS", containing project name and completion date.
 - 1.26.4.2. list of contents.
 - 1.26.4.3. list of names, addresses and telephone numbers of installing Subcontractors and Suppliers for future repair or maintenance.
 - 1.26.4.4. schedule of Finishes (as-built) listing paints, colours and fabrics provided.
- 1.26.5. Refer to Divisions 21, 22, 23, 26, 27 and 28 for supplementary requirements.
- 1.26.6. Provide operation and maintenance instructions as required by the Contract Documents.

1.27. MISCELLANEOUS SUBMITTALS

- 1.27.1. Supply submittals required by the Contract Documents (e.g., plans, reports, certifications, results, records, etc.) for the Consultant's review.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Read and conform to the Contract Documents including Division 1 requirements and documents referred to in this section.

1.2. REFERENCES

- 1.2.1. Reference Standards:

- | | | |
|----------|-------------------|---|
| 1.2.1.1. | ASTM E329 | -Specification for Agencies Engaged in Construction Inspection and/or Testing |
| 1.2.1.2. | CSA A283-06 | - Qualification Code for Concrete Testing Laboratories |
| 1.2.1.3. | CSA W47.1-03 | - Certification of Companies for Fusion Welding of Steel |
| 1.2.1.4. | CSA W59-03 | - Welded Steel Construction (Metal Arc Welding) |
| 1.2.1.5. | CSA W178.1-08 | - Certification of Welding Inspection Organizations |
| 1.2.1.6. | CSA W178.2-08 | - Certification of Welding Inspectors |
| 1.2.1.7. | CAN/CSA-Z234.1-00 | - Metric Practice Guide |
| 1.2.1.8. | NFPA 101-09 | - Life Safety Code |

1.3. REGULATIONS REQUIREMENTS

- 1.3.1. Comply with the *Building Code Act, 1992*, S.O. 1992, c. 23 as amended, and the Building Code, O. Reg. 332/12, as amended and Regulations and bylaws of other Authorities Having Jurisdiction, including latest amendments thereto; all hereafter referred to as the Code. Where the Code or the Contract Documents do not cover particular requirements which are covered by NBC, as amended, conform to requirements of NBC including its related supplements. Where the Contract Documents exceed the Code requirements, satisfy such additional requirements.
- 1.3.2. Pre-Start Health and Safety Review (PSR): Whether or not this is required by law, under this Contract ensure any Product, tool or process provided as Work of this Contract complies with the requirements of the *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1, Regulation 851: Industrial Establishments, R.R.O. 1990, Reg. 851, as amended and certify same to Consultant prior to Substantial Performance of the Contract. For guidance, refer to "Guidelines for Pre- Start Health and Safety Reviews: How to Apply Section 7 of the Regulation for Industrial Establishments" dated April 2001 published by the Government of Ontario. Ensure all exemption documents or PSR reports are complete and correct prior to handing over to the Owner. Provide 3 sets of originals to the Owner.
- 1.3.3. Conform to NFPA 101 for exit requirements.
- 1.3.4. Conform to the Fire Code, O. Reg. 213/07: enacted under *Fire Protection and Prevention Act, 1997*, S.O. 1997, c. 4, as amended.
- 1.3.5. Where material is designated in the Contract Documents for certain application, unless otherwise specified, that material shall conform to standards designated in OBC and in absence of more restrictive requirement comply with Division B, Part 9 "Housing and Small Buildings" of the Code. Similarly, unless otherwise specified and not required otherwise by OBC, installation methods and standards of workmanship shall also conform to standards of Division B, Part 9. Where specific requirements for a material are not specified for certain use, select from choice offered in Division B, Part 9.

- 1.3.6. Unless otherwise indicated in the Contract Documents, obtain and pay for all other permits, licenses and certificates of inspection. Ensure permits, licenses and certificates included under specific sections are obtained as specified. Forward copies of all permits to the Consultant before commencing work.
- 1.3.7. Comply with all requirements of the *Workplace Safety and Insurance Act, 1997*, S.O. 1997, c. 16, Sched. A, including payments due thereunder.
- 1.3.8. Apply the *Ontario College of Trades and Apprenticeship Act, 2009*, S.O. 2009, c. 22, and regulations thereunder, as amended, to performance of this Contract.

1.4. IMPERIAL/INTERNATIONAL SYSTEM OF UNITS (SI)

- 1.4.1. Submittals containing measurements of any kind in Imperial system of measurement shall be on the Consultant's approval only. Submit all measurements in International System of Units (SI).
- 1.4.2. Submittals containing measurements of any kind shall have measurements in language of International System of Units (SI) conforming to CAN/CSA-Z234.1.

1.5. REFERENCES

- 1.5.1. Where reference is made to codes, specification standards, manuals, contract forms, installation, application and maintenance instructions, produced by various organizations, conform to edition of standards specified or, if not specified, to latest edition as amended and revised to date of the Contract.
- 1.5.2. Amendments to reference documents after award of the Contract affecting the Contract Price shall be dealt with in accordance with GC 6 - Changes in the Work of the General Conditions of the Contract.
- 1.5.3. If requested by the Consultant provide copy on Site of such standard(s).

1.6. ACRONYMS

- 1.6.1. Following acronyms are used in the Contract Documents:

AA	Aluminum Association (USA)
ACI	American Concrete Institute
AHA	American Hospital Association
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
API	American Petroleum Institute
ASHE	American Society for Healthcare Engineering
ASHRAE	American Society of Heating, Refrigeration and Air-conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	American Woodwork Institute (USA)
AWMAC	Architectural Woodwork Manufacturer's Association of Canada
AWWA	American Water Works Association
BCA	Building Commissioning Association
BCLMA	British Columbia Lumber Manufacturer's Association
BHMA	Building Hardware Manufacturer's Association
BMEC	Building Materials Evaluation Commission

CAN	National Standards of Canada
CCA	Canadian Construction Association
CCDC	Canadian Construction Documents Committee
CEC	Canadian Electrical Code (published by CSA)
CFR	Code of Federal Regulations
CGA	Canadian Gas Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CLA	Canadian Lumbermen's Association
CMHC	Canadian Mortgage and Housing Corporation
COFI	Council of Forest Industries of British Columbia
CPCI	Canadian Prestressed Concrete Institute
CPMA	Canadian Paint Manufacturer's Association
CRCA	Canadian Roofing Contractors Association
CRI	Colour Rendering Index
CSA	Canadian Standards Association
CSC	Construction Specifications Canada
CSDMA	Canadian Sheet Door Manufacturers Association
CSPI	Corrugated Steel Pipe Institute
CSSBI	Canadian Sheet Steel Building Institute
CTC	Canadian Transport Commission
CWC	Canadian Wood Council
DND	Department of National Defence, Construction Material Board
EEMAC	Electrical and Electronic Manufacturers Association of Canada
ECP	Environmental Choice Program
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ESA	Electrical Safety Authority
FM	Factory Mutual
FSC	Forest Stewardship Council
GANA	Glass Association of North America
ICEA	International Electrical Testing Association
IEC	International Electrotechnical Commission
IAQ	Indoor Air Quality
IEEE	Institute of Electrical and Electronic Engineers
IGMAC	Insulated Glass Manufacturers Association of Canada
ISO	International Organization for standardization
MTO	Ministry of Transportation, Province of Ontario
NAAMM	National Association of Architectural Metal Manufacturers
NBC	National Building Code of Canada 2015
NBFU	National Board of Fire Underwriters (USA)
NEMA	National Electrical Manufacturers Association (USA)
NETA	Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
NFPA	National Fire Protection Association
NHLA	National Hardwood Lumber Association (USA)
NLGA	National Lumber Grades Authority
NRCC	National Research Council Canada
NSC	National Standards of Canada

OBC	Ontario Building Code, "The Building Code", O. Reg. 332/12 including amendments thereto
OFC	Ontario Fire Code, "The Fire Code", O. Reg. 213/07, including amendments thereto
OFM	Ontario Fire Marshall
OIRCA	Ontario Industrial Roofing Contractors Association
OMCA	Ontario Masonry Contractors' Association
OPCA	Ontario Painting Contractors Association
OPSS	Ontario Provincial Standards Section
PEO	Professional Engineers of Ontario
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SJI	Steel Joist Institute
SSPC	Steel Structures Painting Council
TSSA	Technical Standards & Safety Authority
TTMAC	Terrazzo, Tile and Marble Association of Canada
ULC	Underwriters Laboratories of Canada
UL	Underwriters Laboratories Inc. (USA)
WHMIS	Workplace Hazardous Materials Information System
WHPS	Warnock Hersey Professional Services

1.7. ABBREVIATIONS

1.7.1. Following abbreviations are used in Contract Documents:

<	angle
°	degree (angles)
µm	micrometre
#	number (before numerals)
A	ampere
AB	air barrier
ABS	Acrylonitrile butadiene styrene
A/C	air conditioning
AC	alternating current
ACP	acoustic panel
ACT	acoustic ceiling tile
AD	access door
ADJ	adjustable
AFF	Above Finished Floor
AFL	access flooring
ALUM or AL	aluminum
ANOD	anodized
AP	access panel
APPROX	approximate
ARCH	Architectural
A/VB	air/vapour barrier
AWG	American wire gauge

BH	bore hole
BLDG	building
BLKG	blocking
B.M	bench mark
BN	bull nose
BOL	bollard
B.RLG	bumper railing
BUR	built up roof
CABT	cabinet
CB	catch basin
C.BLK	concrete block
CEM	cement
CEM.BD	cement board
CEM.PL	cement plaster
cfs	cubic feet per second
CG	corner guard
CGL	clear glass
CH	coat hook
CHK.BD	chalk board
CHK.PL	checkered plate
CI	cast iron
CJ	control joint
CL	centreline
CLG	ceiling
CO	clean out
COL	column
CONC	concrete
CONSTR	construction
CONT	continuous
CPT or CP	carpet
CR	chair rail
CSK	countersunk
CT	ceramic tile
cu ft	cubic feet
cu yd	cubic yard
CW	curtain wall
c/w	complete with
DB	decibel
DC	direct current
DDC	Direct Digital Control
deg C	degree Celsius
deg F	degree Fahrenheit
DET	detail
DF	drinking fountain
DFT	dry film thickness
DG	double glazed
dia	diameter
DIN	Deutsches Institute for Normung
DN	down
DP	dampproof
DPC	dampproof course
DWG	Drawing

EF	epoxy flooring
EIFS	exterior insulation and finish system
EJ	expansion joint
EJC	expansion joint cover
ELEC	electric
ELEV	elevation
EMT	electro metallic tubing
EMS	Energy Management System
ENAM	enamel
ENCL	enclosure
ENT	entry
EP	electrical panel
EQUIP	equipment
ET	epoxy terrazzo
EXIST	existing
EXP	exposed
EXT	exterior
FA	fire alarm
FBD	fibreboard
FBR	face brick
FC	flexible coating
FD	floor drain
FHC	fire hose cabinet
FIN	finished
FL	floor
FOB	free on board
FP	fireproofing
fpm	feet per minute
FS	firestopping
(ft)(')	foot
FTG	footing
FWC	fabric wall covering
FWP	fiberglass wall protection
g	gram
ga	gauge
gal	gallon (Imperial measure)
GALV	galvanized
GASK	gasket
GB	gypsum board
GCB	glazed concrete block
GFI	ground fault interrupter
GFRG	glass fibre reinforced gypsum
GL	glass/glazing
GL.B	glass block
GRAN.A	granular A
GRAN.B	granular B
GRD	ground
GT	glass tile
GWG	georgian wired glass
ha	hectare
HB	hose bib

HC	hollow core
HDBD	hardboard
HM	hollow metal
HORIZ	horizontal
hp	horsepower
hr	hour
H/RAIL	handrail
H.RLG	hand railing
HS	hollow steel
HSS	hollow structural section
HT	height
HU	heating unit
HVAC	heating, ventilation and air conditioning
Hz	hertz
id	inside diameter
lgpd	gallons per day (Imperial measure)
lgph	gallons per hour (Imperial measure)
(in.)(")	inch
INCL	including
INSUL	insulation
INT	interior
INV	invert
IRGB	impact resistant gypsum board
J	joule
JT	joint
KD	knocked down
kg	kilogram
km	kilometre
kN	kilonewton
KO	knock out
kPa	kilopascal
l	litre
LAB	laboratory
LAV	lavatory
lb	pound
lb/ft	pound per foot
LED	light emitting diode
LH	Left Hand
LHR	Left Hand Reverse
lin ft	linear foot
LIN.MET	linear metal ceiling
LINO	linoleum
LL	lead lined
LS	light standard
l/s	litre per second
LSSJ	long span steel joist
LUM	luminous
m	metre
m ²	square metre
m ³	cubic metre

MAT'L	material
max	maximum
MB	marker board
MBF	thousand board feet
MCC	motor control centre
MECH	mechanical
MEZZ	mezzanine
min	minimum
misc	miscellaneous
ML	metal lath
mm	millimetre
MPa	megapascal
MRGB	moisture resistant gypsum board
MSDS	material safety data sheet
N	newton
NIC	Not in Contract
N.m	newton metre
No.	Number
NOM	nominal
NTS	not to scale
O/A	overall
oc	on centre
od	outside diameter
O/H	overhead
O&M	Operation and Maintenance
OPP	opposite
OWSJ	Open Web Steel Joist
oz	ounce
P	partition
Pa	Pascal
PA	public address system
P.CONC	precast concrete
PC	Pre-functional Checklists
PERP	perpendicular
PL	plate
PLAM	plastic laminate
PLAS	plaster
PLYWD	plywood
PM	pressed metal
PR	pair
PREFAB	prefabricated
PREFIN	prefinished
PRP	plastic resin paneling
PS	pressed steel
psi	pounds per square inch
PT	paint
PVC	polyvinyl chloride
QT	quarry tile
R	riser
RB	resilient base
R. CONC	reinforced concrete
RD	roof drain
REINF	reinforced
REQ'D	required

rev	revision
RH	Right Hand
RHR	Right Hand Reverse
RM	room
rpm	revolutions per minute
RPU	remote processor unit
RS	reducing strip
RT	rubber tile
RWL	rain water leader
RWP	rigid wall protection
s	second
SAN	sanitary
SAT	suspended acoustic tile
SB	sand blast
SC	solid core
SG	security glazing
SHV	sheet vinyl
SIM	similar
SLC	sealed concrete
SLR	sealer
SLT	slate tile
SN	stair nosing
SPEC	specification
SPR	sprinkler
SQ	square
sq ft	square feet
sq mi	square mile
sq yd	square yard
SR	seamless resin
SS	stainless steel
STL	steel
STRUCT	structural
SUSP	suspended
t	tonne
TB	tack board
TBR	to be removed
TCP/IP	Transmission Control Protocol/Internet Protocol
TEL	telephone
TEMP	temporary
TERR	terrazzo
T&G	tongue & groove
TYP	typical
U/C	under cut
U/G	under ground
U.O.N.	unless otherwise noted
UPS	uninterruptible power supply
U/S	under side
USgpm	gallons per minute (United States measure)
V	volt
VA	volt ampere
VAC	volt alternating current

VAV	Variable Air Volume
VDC	volt direct current
VB	vapour barrier
VCT	vinyl composite tile
VERT	vertical
VEST	vestibule
VOC	Volatile Organic Compound
Vrms	Voltage Regulator Module
VT	vinyl tile
vt ft	vertical foot
VWC	vinyl wall covering
VWP	vinyl wall protection
W	watt
WB	white board
W.CAB	writing cabinet
WC	water closet
WD	wood
WF	wide flange WGL
WM	wire mesh
WP	waterproofing
WPM	waterproof membrane
WPS	wall protection strip
WR	washroom
WVP	wood veneer paneling
WWF	welded wide flange
WWM	welded wire mesh
yd	yard
Z	zinc
ZCS	zinc coated steel

1.8. BUILDING SCIENCE PRINCIPLES

1.8.1. Obtain and read following references:

- | | | |
|----------|------------------------------|--|
| 1.8.1.1. | NRCC 13487 | - Walls Windows and Roofs for the Canadian Climate |
| 1.8.1.2. | Canadian Building Digest 55 | - Glazing Design |
| 1.8.1.3. | Canadian Building Digest 96 | - Use of Sealants |
| 1.8.1.4. | Canadian Building Digest 155 | - Joint Movement and Sealant Selection |

1.9. QUALITY ASSURANCE

- 1.9.1. Study and be aware of principles discussed in above documents in order to understand their significance to the Contract Documents.
- 1.9.2. Some information in above reference documents may not be applicable to the Work and no recommendations or statement therein is a mandatory requirement of the Contract unless required by the Contract Documents.

1.10. TOLERANCES

- 1.10.1. Unless more stringent tolerances are required by a section of the Specifications or a referenced standard, meet following tolerances for installed work:

- 1.10.1.1. "plumb" means plumb within 3 mm in 3 m (1/8" in 10' - 0").
- 1.10.1.2. "level" means level within 3 mm in 3 m (1/8" in 10' - 0").
- 1.10.1.3. "square" means not in excess of 10 seconds, less or more than 90°.
- 1.10.1.4. "straight" means within 3 mm in 3 m (1/8" in 10' - 0"), under a 3 m (10' - 0") straightedge.

1.11. QUALIFICATIONS

- 1.11.1. For manufacturer's, fabricator's and installer's qualifications, conform to requirements specified under respective trade section, as applicable. Where applicable, manufacturer's field services shall be obtained as specified under respective trade section.

1.12. PROFESSIONAL ENGINEER'S QUALIFICATIONS

- 1.12.1. Employ a professional engineer registered to practice in Province of Ontario carrying a minimum \$2,000,000.00 professional liability insurance to:
 - 1.12.1.1. design components of the Work of this Project specific to their license to practice.
 - 1.12.1.2. be responsible for determining sizes or other specific requirements within their license to practice in accordance with applicable codes and regulations.
 - 1.12.1.3. be responsible for production and review of Shop Drawings.
 - 1.12.1.4. inspect work of this Section during fabrication and erection/installation.
 - 1.12.1.5. be responsible for stamping and signing each Shop Drawing and associated calculations performed.
 - 1.12.1.6. provide site administration and inspection of this part of the Work.
 - 1.12.1.7. Certification: Submit certification stating performance of engineered work will perform as required.

1.13. TESTING AGENCY QUALIFICATIONS

- 1.13.1. Conduct testing in accordance with requirements of OBC unless advised otherwise in the Contract Documents or by the Consultant. Obtain certification where required by applicable codes and standards.
- 1.13.2. Ensure testing agency is an independent testing agency with experience and capability to conduct testing indicated, as documented according to ASTM E329.
- 1.13.3. Qualifications of inspectors: Submit list of inspectors to be employed on this Contract and obtain the Consultant's approval.
- 1.13.4. Ensure testing and inspection is performed by qualified inspectors and/or technologist certified by the Professional Engineer or performed directly by the Professional Engineer in conformance with applicable codes and certification programs.
- 1.13.5. Ensure inspectors are qualified to perform type of inspection or testing required.
- 1.13.6. Perform concrete testing using a testing company conforming to requirements of CSA A283 as required for this Contract. Inspection report format and distribution requirements will be established by the Consultant.

1.14. CONTRACTOR'S QUALIFICATIONS

- 1.14.1. Prior to commencement of the Work, establish quality control system protocols, rules, related chain of commands and commitment to provide quality work as intended in the Contract Documents for the Work.

- 1.14.2. Provide position Specification of quality control staff, shop and field supervisors complete with their skills, knowledge, duties and responsibilities.

1.15. SOURCE QUALITY CONTROL

- 1.15.1. Refer to respective Specification sections for source quality control requirements.

1.16. TESTING AND INSPECTION OF MECHANICAL AND ELECTRICAL SYSTEMS

- 1.16.1. Provide testing and inspection of mechanical and electrical systems as defined in the Contract Documents under trade sections of Divisions 21, 22, 23, 26, 27 and 28 respectively.

1.17. INTERIOR

- 1.17.1. Architectural millwork.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Read and conform to the Contract Documents including Division 1 requirements and documents referred to in this Section.

1.2. TEMPORARY UTILITIES

- 1.2.1. Temporary Protection: Provide and maintain following temporary protection at all times:
- 1.2.1.1. Window Openings: Translucent, weatherproof protection until windows and glazing are installed.
 - 1.2.1.2. Door Openings: Minimum wood doors, frames, hinges, locks and bolts to exterior and interior to existing areas.
 - 1.2.1.3. Air Intakes: Provide protection against infiltration of dirt, dust and other deleterious matter.
 - 1.2.1.4. Temporary Dust Tight Partitions: Separate areas of work from occupied portions of building with temporary dust tight partitions constructed from floor to underside of structure. Construct temporary dust tight partitions as fire separations having a fire resistance rating of 1 hour consisting of 16 mm (5/8") gypsum board, both sides on steel stud partition conforming to ULC Design No. W407 and to ULC Design No. W408. Paint public sides of partitions with minimum 2 coats of low VOC paint in colours selected by the Consultant. Seal edges and joints to achieve positive protection. Provide lockable door(s) in temporary dust tight partition(s) where indicated on Drawings and extra key to the Consultant. Remove temporary dust tight partitions promptly when no longer required and Make Good adjacent surfaces. Hoarding/temporary dust tight partitions are to remain in-place unless noted otherwise.
 - 1.2.1.5. Provide temporary dust tight partitions beyond those shown on Drawings where risk of falling objects exist, to protect the public and the Owner's personnel.
- 1.2.2. Temporary Fire Protection:
- 1.2.2.1. Provide and maintain sufficient temporary standpipes and connections, fire hose, valves, temporary cabinets and extinguishers, to comply with requirements of the governing municipal and provincial authorities to satisfaction of the Consultant and local fire department and insurance authorities in order to protect the property of the Owner against fire hazards during construction.
 - 1.2.2.2. Adjust and modify temporary fire protection facilities to accommodate progress of the Work.
 - 1.2.2.3. Bulk storage of flammable liquids and other hazardous materials is not allowed on the Site.
 - 1.2.2.4. Bringing in, use and disposal of gasoline, benzine or other flammable materials must be handled with good and safe practice as required by authorities having jurisdictions.
 - 1.2.2.5. Maintain temporary fire protection systems in operation 24 hours a Day.
 - 1.2.2.6. Provide and maintain temporary access routes to exits, clear and visibly identified, 24 hours a Day.
 - 1.2.2.7. Take necessary precautions to eliminate fire hazards and to prevent damage to Work, building materials, equipment and other property, both public and private, having to do with the Work. Inspect Work of this Contract at least once a week for this purpose.
 - 1.2.2.8. In areas of existing building being renovated and adjacent areas where affected by

construction activities, make necessary adjustments and modifications to temporary fire protection as required during progress of the Work, removing such temporary modifications when the permanent system is installed and operating. Maintain all existing fire exits at all times.

- 1.2.2.9. Provide fire protection to satisfaction of the Consultant, to Authorities Having Jurisdiction and to insurance Authorities stipulated by Owner. Maintain in operation 24 hours a Day.
- 1.2.2.10. Provide and maintain free access from street to fire hydrants and to outside connections for standpipes or other fire extinguishing equipment, permanent or temporary; and maintain free access to control valves and hoses on fire lines within building and to all portable fire extinguishers. Ensure devices are visibly identified 24 hours a Day.
- 1.2.2.11. Provide and maintain in working order, suitable Underwriters' Laboratories of Canada labelled fire extinguishers and locate in prominent positions, to approval of Authorities Having Jurisdiction. Such extinguishers remain property of the Contractor. Remove from building at date of Substantial Performance of the Work.
- 1.2.2.12. Store and locate materials and equipment packed in cardboard cartons, wood crates and other combustible containers in orderly and accessible manner. Place approved types of fire fighting equipment in vicinity of materials or equipment packed in this type of crate or carton until permanent fire protection and equipment are available.
- 1.2.2.13. Store rags and waste containing oil, grease or other flammable materials in an approved metal container and remove from Site at end of each Working Day.
- 1.2.2.14. Only fire-resistant tarpaulins are permitted on Site.
- 1.2.2.15. Provide temporary standpipes as Work proceeds in accordance with the regulations under the *Occupational Health and Safety Act*, R.S.O. 1990, c. O.1, as amended.
- 1.2.2.16. In eliminating fire risks, or effectively controlling Site activities to minimize fire risk, observe following precautions as a minimum:
 - 1.2.2.16.1. Prior to commencing Work in any area, ensure workers are acquainted with the location of all fire-fighting apparatus and are familiar with its proper use and apparatus is in good working order.
 - 1.2.2.16.2. Stop all Work immediately when any deficiencies in fire protection are encountered after Work commences. Remedy all such deficiencies before resuming any other Work.
- 1.2.2.17. Notify the local Fire Department and the Consultant immediately should a fire of any nature occur whether the fire has been extinguished or not. Notify the Newmarket Fire Department and the Consultant of any fire alarm shutdowns; notify once fire alarm has been recertified and operational.
- 1.2.2.18. If the Contractor is the cause of a false alarm, it may be required to reimburse the Owner for any charges from the Newmarket Fire Department resulting from the false alarm.
- 1.2.2.19. Establish a logbook maintained by the Contractor which records all activity affecting the Owner's fire alarm system. The log book shall record the date, time, trade, worker's name, nature and location of Work performed, zone or zones affected, status of the system while Work was performed, time and date of completion of the operation, and status of the system upon completion of the Work. At the end of each Working Day, the Contractor shall review the log and sign indicating system is fully operational, except as recorded by the log. Inform the Owner of system status and which zones may be affected daily prior to the commencement of any new operation that affects the fire alarm system.

1.3. CONSTRUCTION FACILITIES

1.3.1. Contractor's Field Offices and Sheds:

1.3.1.1. Provide the Contractor's field offices and storage sheds within the Place of the Work only. Provide offices and sheds, properly painted and maintained.

1.3.1.2. Provide following field office facilities:

1.3.1.2.1. A room to accommodate 15 persons for Site conference and job meetings, heated and air conditioned to maintain a temperature of 21 deg C (70 deg F) +/-2 deg C (4 deg F).

1.3.1.2.2. Telephone services for the Contractor's own use.

1.3.1.2.3. "No Smoking" signs.

1.3.1.2.4. Provide proper flammable and explosive materials storage.

1.3.1.3. Floor Area: Minimum 250 sq. ft.

1.3.1.4. Facilities:

1.3.1.4.1. one desk (900 mm x 1500 mm (3' x 5') minimum).

1.3.1.4.2. one desk lamp (incandescent).

1.3.1.4.3. one smartphone.

1.3.1.4.4. three chairs.

1.3.1.4.5. one table and lamp.

1.3.1.4.6. one full-length, counter-height plan table with 3 plan drawers and storage under.

1.3.1.4.7. two tall stools.

1.3.1.4.8. one openable window to the outside (minimum 600 mm x 900 mm (2' x 3')).

1.3.1.5. Services:

1.3.1.5.1. electrical (minimum 3 receptacles).

1.3.1.5.2. lighting.

1.3.1.5.3. air conditioning.

1.3.2. Sanitary Facilities:

1.3.2.1. Existing toilet facilities may be used as directed provided they are kept clean and serviced. Repair damage to existing toilet facilities and clean before completion of the Work.

1.3.2.2. The Owner may back charge the Contractor for additional cleaning of facilities if not kept clean.

1.3.3. Garbage Removal: Do not use institutional garbage bin facilities for removal of construction rubbish and debris. Provide garbage bins and schedule pick up of garbage. Coordinate location of garbage bins with Consultant. Conform to the Consultant's requirements. Repair damage to Site surface upon removal of garbage.

1.4. CONSTRUCTION AIDS

- 1.4.1. Scaffolding: Erect fixed or mobile scaffolding as applicable independent of walls. Use it in manner as to interfere as little as possible with other sections. When not in use, move it as necessary to permit installation of other work. Construct and maintain scaffolding in rigid, secure and safe manner. Remove it promptly when no longer required, and if required for longer than a Day, remove it at the end of each Day and store in secure place as directed.

1.5. VEHICULAR ACCESS AND PARKING

- 1.5.1. Parking for the Contractor's vehicles shall be arranged with the Owner and Consultant. The Owner will not be responsible for parking fines incurred by the Contractor, Subcontractors or their employees.
- 1.5.2. Do not be nuisance to public traffic any time. Manage construction traffic by using designated roads and by providing trained flag persons to direct public traffic as appropriate.
- 1.5.3. Existing Parking Facilities: Parking is available to construction personnel. Arrangements must be made with Owner regarding the location of parking to be provided.

1.6. TEMPORARY CONTROLS

- 1.6.1. Pollution Control: Take appropriate dust control measures to avoid contamination of adjacent areas near Site from dust. Respond immediately to complaints of dust received from public, Authorities, or the Consultant. Keep public and private roads free of dust, mud and construction debris resulting from trucks employed on this project.
- 1.6.2. Noise and Vibration Control: Control noise and vibration generated by the Work. Respond immediately to complaints of noise and vibration received from public, Authorities Having Jurisdiction, or Consultant.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Read and conform to the Contract Documents including Division 1 requirements and documents referred to in this section.

1.2. REFERENCES

1.2.1. Reference Standards:

- 1.2.1.1. ANSI/ASME B18.6.3-03(08) - Machine Screws and Machine Screw Nuts
- 1.2.1.2. CSA W47.1-03(08) - Certification of Companies for Fusion Welding of Steel
- 1.2.1.3. CSA W47.2-M87(08) - Certification of Companies for Fusion Welding of Aluminum
- 1.2.1.4. CSA W59-03 - Welded Steel Construction
- 1.2.1.5. CSA W59.2-M91(08) - Welded Aluminum Construction
- 1.2.1.6. CAN/ULC-S101-07 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
- 1.2.1.7. CAN/ULC-S107-03 - Methods of Fire Tests of Roof Coverings

1.3. BASIC PRODUCT REQUIREMENTS

- 1.3.1. Material, Machinery, Equipment and Fixtures: Product employed in the Work shall be those which affect indoor air quality as little as possible. Provide adequate ventilation during installation of finishing materials to avoid effect on indoor air quality.
- 1.3.2. Material, plant, equipment and fixtures specified shall form basis of the Contract. Where more than 1 brand or manufacturer is named in Specifications, or on Drawings, Contractor shall have choice to use 1 of specified manufacturer or brand or Equivalent provided requirements of the Drawings and Specifications are met.
- 1.3.3. Ensure materials, plant, equipment and fixtures are not damaged or defective and of quality specified and compatible for purpose intended. If requested provide evidence as to type, source and quality. Remove and replace defective Products, at own expense, regardless of previous reviews and be responsible for delays and expenses caused thereby. Replace factory finished equipment, or parts thereof, whose paint finish is damaged and cannot be reasonably remedied by paint touch-up.
- 1.3.4. When conflict occurs between specified technical description and manufacturer's standard model numbers and/or manufacturer's printed description of given model number, technical description specified in the Contract Documents shall govern. Manufacturers shall make necessary modifications in their manufacturing methods to meet requirements specified.
- 1.3.5. Do not expose trademarks, labels and nameplates, including applied labels, in finished Work. Remove visible trademarks and labels except those which are giving operating instructions, which are essential to obtain identification of mechanical and electrical equipment for maintenance and replacement purposes and for mandatory fire ratings.
- 1.3.6. In general, the Owner retains right to select all choices available within specified Products colours, finishes and other options unless specified otherwise in the Contract Documents.

1.3.7. Toxic or Hazardous Substances and Materials:

1.3.7.1. Definitions:

1.3.7.1.1. Normal Mould Concentrations: Indoor concentrations of spores, hyphae and mycelia fragment (both airborne and on surfaces) that are similar in concentration and species population distribution that would be found outdoors in natural environment.

1.3.7.1.2. Mould Amplification: Growth or elevated population of mould (both airborne and on surfaces) including visible growth or staining on any building material. This amplification is most often caused by water damage to building materials.

1.3.7.3. Products and materials incorporated in the Work shall be as free as possible of noxious or toxic volatile emissions or emissions of irritating or toxic particles, so interior air of completed building is as pollution-free as possible. (For example, Products emitting benzene, mercury, lead or other known toxic compounds are not acceptable.)

1.3.8. Availability:

1.3.8.1. Immediately upon signing the Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are likely or possible, or Products are no longer available, or a specified manufacturer is no longer in business, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the Work.

1.3.8.2. Products which are specified by their proprietary names, by part, or catalogue number form basis of the Contract. Alternative products, materials or manufacturers may be proposed by the Contractor during the course of the Contract. The Contractor shall demonstrate to the Consultant's satisfaction that the proposed substitutions are equivalent to the particular product, material or manufacturer prescribed by the Contract Documents and obtain the Consultant's written acceptance of the proposed alternative products prior to incorporating any substitutes into the Work.

1.3.8.3. In the event of failure to notify the Consultant at commencement of the Work of supply delays or Product availability issues, and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves right to substitute more readily available Products of similar character, at no increase in the Contract Price.

1.3.8.4. No substitution of materials will be allowed on basis of long deliveries unless the substitution of materials has been approved in writing by the Owner.

1.3.9. Gauges:

1.3.9.1. Interpret gauges of uncoated steel sheet based on manufacturer's standard gauge (msg), stainless steel sheet based on "United States Standard Gauge (Revised)" and non-ferrous sheet metals based on "Brown & Sharpe Gauge". For galvanized steel sheet based on galvanized sheet gauge (ga).

1.3.9.2. Interpret gauges specified for wire as "Steel Standard" and for non-ferrous wire, as "American".

1.3.10. Fire Rating:

1.3.10.1. Where material, component or assembly is required to be fire rated, fire rating shall be determined on basis of results of tests conducted in conformance with CAN/ULC-S101 by 1 of following testing authorities acceptable to Authorities Having Jurisdiction:

1.3.10.1.1. Underwriters Laboratories of Canada (ULC); www.ulc.ca

1.3.10.1.2. Underwriters Laboratories Inc. (UL); www.ul.com

1.3.10.1.3. FM Global; www.fmglobal.com

1.3.10.1.4. National Research Council of Canada; www.nrc.ca

1.3.10.1.5. National Board of Fire Underwriters.

1.3.10.1.6. Warnock Hersey Mark www.warnockhersey.com

1.3.10.2. Where reference is made to only one testing authority, an equivalent fire rating as determined or listed by another of aforementioned testing authorities is acceptable if approved by Authorities Having Jurisdiction. Obtain and submit such approval of Authorities Having Jurisdiction, in writing, when requesting acceptance of a proposed equivalent rating or test design.

1.3.11. Manufacturers' Written Instructions:

1.3.11.1. Unless specified otherwise, use each Product in accordance with manufacturer's published written instructions regarding handling, storage, preparation, methods of installation, protection and cleaning. Take into account Site conditions and provide ancillary Products or accessories.

1.3.11.2. Conform to manufacturer's recommended installation temperatures. If finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and the Consultant. Repair resulting damage should expansion provisions prove inadequate.

1.3.11.3. Notify the Consultant, in writing, of conflicts between the Contract Documents and manufacturer's instructions, so the Consultant may establish course of action to be taken. If requested, make a copy of those instructions available at the Site.

1.3.11.4. Improper installation or erection of Products, due to failure to comply with these requirements, shall require removal and re-installation at no increase in the Contract Price.

1.3.11.5. Whenever specific reference to following manufacturer's directions or instructions is made in Specifications, upon request submit copies thereof for review by Consultant before commencing such Work.

1.3.12. Anchors and Fasteners:

1.3.12.1. Supply appropriate anchors, fasteners, accessories and adhesives required for fabrication and erection of the Work.

1.3.12.2. Unless specified otherwise use exposed metal fastenings and accessories of same texture, colour and finish as Product being fastened.

1.3.12.3. Use metal fastenings of same material as metal component being fastened, or of metal which will not generate electrolytic action and cause damage to fastening or metal component under moist conditions. In general use non-corrosive or hot dip galvanized steel anchors occurring on or in exterior wall, slab or other exterior locations, unless higher standard is indicated or specified.

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- 1.3.12.4. Fastening devices or adhesives shall be of appropriate type, used in sufficient quantity and in such manner to provide positive, permanent fastening which will not shift, work loose or fail during occupancy of building due to vibration or other causes resulting from normal use of building. Install anchors at spacing to provide required load/stress carrying capacity. Do not use wood plugs.
 - 1.3.12.5. Lay out fastenings neatly, evenly spaced and aligned. Keep exposed fastenings to minimum.
 - 1.3.12.6. Supply adequate instructions and templates and, if necessary supervise installation, where fastenings or accessories for sections which are required to be built into work of other sections.
 - 1.3.12.7. Do not use fastenings which will cause spalling, cracking, or deformation or deterioration of material being fastened by or to.
 - 1.3.12.8. Do not use powder actuated fastening devices, which are used in tension, without approval. Take stringent safety precautions when using powder actuated fastenings. Use only low velocity plunger-type devices.
 - 1.3.12.9. Use adhesives specified, or if not specified, those recommended by manufacturer of materials involved, compatible with materials to be joined, and effective in forming permanent joint of adequate strength.
 - 1.3.12.10. Use screws, nails, staples and other similar driven fasteners suitable to materials to be joined and to conditions under which they are installed and used. Ensure in finished work, fasteners are sized to take durable hold under stress to be encountered without damage to, or weakening of, elements secured together and fastenings will not corrode or cause staining of exposed surfaces.
 - 1.3.12.11. Security Screws: Complying with ANSI/ASME B18.6.3; provide only tamper-resistant Torx-Plus® or Equivalent break off type screws as specified and noted on Drawings. Provide flathead security screws where Torx-Plus® or Equivalent break off is indicated to be counter sunk otherwise provide only trusshead or buttonhead for Torx-Plus® or equivalent and only roundhead for break off type. Torx-Plus® Temper resistant screws or Equivalent with heads having a deep hex-lobular recess with a solid post formed in the centre requiring a special metal driver to install or remove screw. Fasteners and tools shall be of type produced by licensed manufacturer. Break off head security screws with drive heads having an additional hexagonal shaped head designed to break off after installation at a predetermined torque level. Grind remaining portion of neck smooth after hex-head is broken off. Acceptable manufacturers, Temper Proof Screws Inc. or Folger Adam Security Inc, or Sentry Security Fasteners, Inc. or Temper Proof Screw Co. or Equivalent.
 - 1.3.12.12. Do brazing or soldering to form durable connections of strength adequate to resist stresses to be encountered without deformation of elements joined. Prepare base metals and use methods and materials to ensure clean joint, and to prevent staining, corrosion, discolouration, deformation or other damage to the finished Work.
 - 1.3.12.13. Do welding to CSA W59 for steel and to CSA W59.2-M for aluminum, unless specified otherwise. Have welding performed by companies certified operatives to CSA W47.1 or CSA W47.2-M.
 - 1.3.12.14. Provide accessory items or materials required, such as brackets, cleats, connectors, sealants, lubricants, cleaners, protection and similar items, whether specified or not, so the Work is complete and performs as required.
 - 1.3.13. Built in Items: Provide and coordinate location of chases, slots and reglets including frames, sleeves, inserts, anchors, fasteners and bolts, forms and templates.
 - 1.3.14. Patents: Verify existence or exclusivity of patent licenses for Products prior to installation.
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- 1.3.15. Trademarks and Labels: Do not expose trademarks and labels, including applied labels, in finished Work. Remove visible trademarks and labels except those which are essential to obtain identification of mechanical and electrical equipment for maintenance and replacement purposes and for mandatory fire ratings.

1.3.16. Barrier Free Design Requirements:

1.3.16.1. Conform to the latest edition of the Ontario Building Code requirements for barrier free installations.

1.3.16.2. Install switches, telephones, fire-alarm pull stations, and other equipment and devices requiring accessibility by building staff and public, excluding mechanical and electrical room installations, to meet barrier-free requirements. If there is conflict between this requirement and any other Building Code requirement bring to attention of Consultant prior to installation.

1.4. PRODUCT DELIVERY, HANDLING AND STORAGE

1.4.1. Package, crate and brace Products to prevent damage during delivery, storage and handling.

1.4.2. Provide protection to finished surfaces to prevent damage during delivery, storage and handling.

1.4.3. Store packaged materials in original, undamaged condition with manufacturers' labels and seals intact.

1.4.4. Handle and store materials in accordance with manufacturers' and Suppliers' recommendations, in protected locations.

1.4.5. Store materials susceptible to environmental damage in weather-tight enclosures, raised clear of the ground and protected from weather, dampness and deterioration.

1.4.6. Replace Products damaged during delivery to the Place of the Work, storage, handling and installation.

1.4.7. Conform to written procedures for safe handling, storage and use of noxious and hazardous materials including special precaution, safe clean-up and disposal procedures.

1.4.8. Mould Control during Product Storage and Handling:

1.4.8.1. Do not bring building Products onto Site containing toxic moulds.

1.4.8.2. Exercise continuous quality control and enforce mould control requirements upon Subcontractors and establish proper Product storage and delivery sequence to protect Products from weather and other exposures conducive to mould growth.

1.4.8.3. Take special care while handling and storing materials, without limitation, such as particleboard, plywood, cellulose materials, wallpaper, ceiling panels, gypsum boards and insulation with kraft paper back up.

1.4.8.4. Monitor humidity levels and provide adequate ventilation in storage areas. Be watchful of any moisture condition in storage areas. Do not use materials which have been damaged by exposure to moisture and/or showing signs of mould growth.

1.4.8.5. Take measures during Product storage and handling to provide mould free finished construction.

1.5. CONCEALMENT OF SERVICES

1.5.1. Conceal pipes, service lines and ducts in chases, behind furring or above ceilings, except where they are indicated as being exposed to view. Where no ceiling is provided, such items may be exposed, but must be neatly and logically arranged.

1.6. MANUFACTURED ITEMS

- 1.6.1. Where a conflict occurs between specified technical description and manufacturer's standard model numbers and/or manufacturer's printed description of given model number, technical description specified herein governs. The Contractor shall ensure that manufacturers make necessary modifications in their manufacturing methods to meet all aspects of these Specifications.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Read and conform to the Contract Documents including Division 1 requirements and documents referred to in this Section.

1.2. REFERENCES

- 1.2.1. Reference Standards:

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| 1.2.1.1. | ASTM C843-99) | - Specification for Application of Gypsum Veneer Plaster |
| 1.2.1.2. | ASTM C926-99 | - Specification for Application of Portland Cement-Based Plaster |

1.3. PROFESSIONAL ENGINEERS' SERVICE

- 1.3.1. Obtain full time engineering service from Professional Engineer licensed to practice in the Province of Ontario in applicable discipline. Engineering service shall include without limitation, design of structural elements and full inspection services during fabrication, erection and administration during construction.

1.4. DESIGN INTEGRITY AND ARCHITECTURAL REQUIREMENTS

- 1.4.1. Continuity of Fire Separations:

- 1.4.1.1. Conform to following requirements to maintain continuity of fire separations:

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| 1.4.1.1.1. | Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are noncombustible and are tightly fitted. |
| 1.4.1.1.2. | Where a fire separation is required to be of noncombustible construction terminates at exterior wall, underside of floor, ceiling or roof structures and at floors, opening shall be fire stopped with a ULC approved Listed material. |

- 1.4.1.2. Combustible members, fastenings and like shall not be used to anchor fixtures to fire separations.

- 1.4.1.3. Continuity of Sound Attenuating Partitions and Ceilings: Maintain acoustical value of partitions and sound attenuated ceilings by careful location and treatment of ducts, grilles, diffusers and similar mechanical devices and of electrical outlets, boxes and similar electrical devices. Where electrical boxes are situated back-to-back, serving each side of partition, locate them at recommended distance apart laterally and if interconnected, use flexible connections.

- 1.4.1.4. Holes Through Walls, Floors and Roof: Ensure holes through walls, floors and roof are provided by trades as specified and are complete with sleeves, packing insulation, fire stopping and sealant as required for each particular condition.

1.5. EXAMINATION

1.5.1. Acceptance of Conditions:

- 1.5.1.1. Examine Site at no cost or risk to the Owner for all matters relating to the Work, extent of the Work, means of access and egress, all obstacles, rights and interests of other parties which may be interfered with during execution of the Work, all conditions and limitations Contractor to take into consideration in performing the Work, including obstructions, existing structures or facilities, local conditions, actual levels, character and nature of project and any other consideration which may affect performance of the Work.
- 1.5.1.2. Where available obtain existing Drawings pertaining existing building layout, architectural, structural, mechanical, electrical details and assess impact in performing the Work of this Contract.
- 1.5.1.3. Examine existing conditions at no additional cost to the Owner, surfaces and substrata upon which Work depends. Drawings are, in part, diagrammatic and are intended to convey scope of Work and indicate general and approximate location, arrangement and sizes of fixtures, equipment, ducts, piping, conduit and outlets and similar items. Obtain more accurate information about locations, arrangement and sizes from study and coordination of the Drawings, including Shop Drawings and manufacturers' literature and become familiar with conditions and spaces affecting these matters before proceeding with the Work.
- 1.5.1.4. Ensure each Subcontractor has full understanding of extent of its Work. Report in writing defects in such Work and notify Subcontractors responsible for unfavourable and unsatisfactory conditions. Do not commence the Work until unsatisfactory conditions have been corrected. Verify corrected Work prior to commencing Work. Execution and application of Work shall be deemed acceptance of Work upon which Work depends.

1.5.2. Existing Activities, Facilities and Conditions:

- 1.5.2.1. Existing institution may be in operation throughout the Work. Do not interrupt existing services, facilities and activities at complex, except for authorized and scheduled interruptions of services acceptable to the Owner. Obtain written permission of the Owner a minimum of 3 Working Days in advance of any shutdown required for tie-in of new construction systems. Written requests for shutdown permission shall clearly identify exact extent of systems affected, time and duration.
- 1.5.2.2. Make necessary enquiries to determine locations of existing services such as hydro, telephone, water, natural gas, sewer and like. Make arrangements and pay all costs to temporarily relocate, shore, underpin or in any way accommodate existing services which affect the Work of this Contract.
- 1.5.2.3. Should any piping, sewers, cables, or similar services be encountered during Work of this Contract that are not known from the Owner's and utilities companies' records, notify Consultant and do not proceed with removal or cutting until directed.
- 1.5.2.4. Protect and maintain in operation all existing services and systems. When removing or altering existing services, make safe, secure and maintain seals as applicable for all lines affected.
- 1.5.2.5. Perform required shutdowns outside of normal working hours at no increase in cost if requested by the Owner.

1.6. MATERIALS

- 1.6.1. Where Specification requirements include design of a Product or system, and minimum material requirements are specified, design of such Product or system shall employ materials specified within applicable section. Where materials or components are not specified, the Contractor shall augment materials with those of its choice within applicable municipal, federal and provincial regulatory limitations while maintaining integrity of design and architectural requirements.
- 1.6.2. Defective Products, whenever identified prior to completion of the 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 and/or damaged Products at own expense and be responsible for delays and expenses caused by rejection.
- 1.6.3. Ensure new materials used to repair damage are compatible with existing Work.

1.7. PREPARATION

- 1.7.1. Planning, Scheduling & Coordination of Alterations:
 - 1.7.1.1. Plan and schedule alterations to accommodate anticipated difficulties, indicated on and inferable from the Contract Documents.
 - 1.7.1.2. Plan, schedule and coordinate alterations to accommodate on-going operations of the Owner with minimal disruption.
 - 1.7.1.3. Plan, schedule and coordinate alterations, required in the Owner-occupied spaces or adjoining or below the Place of the Work, on a room-by-room basis and in accordance with a schedule mutually agreed upon with the Owner. Requests for access to occupied areas shall be made to the Owner a minimum of 1 week in advance of requested access time.
 - 1.7.1.4. Co-ordinate alterations with Other Contractors and proceed with the Work expeditiously.

1.8. EXECUTION

- 1.8.1. Existing Conditions:
 - 1.8.1.1. Make Good surfaces and finishes damaged or disturbed due to the Work of this Contract to match existing. Ensure materials used to repair damage are compatible with existing Work.
 - 1.8.1.2. Restore the Site to condition equal to or, if specified elsewhere, to condition better than existing conditions.
 - 1.8.1.3. Restore lands outside of limits of Work which are disturbed due to the Work to original condition in addition to complying with requirements of the General Conditions of the Contract.
- 1.8.2. Installation:
 - 1.8.2.1. Except where specified otherwise, use each Product in accordance with manufacturer's published or written instructions, Specifications or recommendations regarding handling, storage, preparation, Site conditions, ancillary Products or accessories, methods of installation, protection and cleaning. Submit copy of such instructions and indicate if and where there is discrepancy between them and requirements of Specifications and obtain direction from Consultant if necessary.
 - 1.8.2.2. Whenever specific reference to following manufacturer's directions or instructions is made in Specifications, submit copies as requested thereof for review before commencing such Work.

- 1.8.2.3. Do the Work in accordance with industry practice for type of Work unless the Contract Documents stipulate more precise requirements. Do not let unskilled, incompetent workers perform Work.
- 1.8.2.4. Do the Work in neat and careful manner to retain the Work plumb, square and straight.
- 1.8.2.5. Ensure the Work is properly related to form close joints and appropriately aligned junctions, edges and surfaces and is free of warp, twist, wind, wave or other irregularities.
- 1.8.2.6. When required by the Specifications or by manufacturer's recommendations, have manufacturer, Supplier or accredited agent, inspect Work which incorporates their Products.
- 1.8.2.7. Do not permit materials to come in contact with other materials whether in presence of moisture or otherwise if conditions will result in corrosion, stain or discolouration or deterioration of the completed Work. Provide compatible, durable separators where such contact is unavoidable.
- 1.8.2.8. Intentionally deleted.
- 1.8.2.9. Load no part of structure during construction with load greater than it is calculated to bear safely when completed. Make every temporary support as strong as permanent support. Place no load on concrete structure until it has sufficient strength to safely carry such load.
- 1.8.2.10. Conceal pipes, ducts, conduits, tubing, wiring and other items requiring concealment in floor, wall and ceiling construction of finished areas except where indicated or specified otherwise in the Contract Documents. If in doubt as to method of concealment, or intention of the Contract Documents in this connection, request clarification from the Consultant before proceeding with Work in question.
- 1.8.2.11. Install and arrange fixtures, equipment, ducts, piping and conduit to conserve as much headroom and space as possible, and avoid interference and obstruction of access. Observe good installation practice for safety, access, maintenance and follow manufacturer's recommendations. Location of fixtures, access panels, outlets and mechanical and electrical components indicated are approximate.
- 1.8.2.12. If requested by the Consultant, and before installation, relocate equipment, services, doors, openings, furring and other work at no additional cost to the Owner; provided such relocation involves only reasonable minor adjustments and reasonable advance notice is given in writing. Ensure identification of electrical and mechanical system installations and other automated systems or equipment shall be provided in accordance with the Contract Documents.

1.9. ALTERATIONS AND REPAIRS

- 1.9.1. Perform Work in a manner such as to cause a minimum of noise and interference to use of existing premises and services. Provide maximum safety for occupants during Work.
- 1.9.2. Throughout entire construction period, provide proper and safe means of fire exit from all zones of existing building at all times, to approval of authorities having jurisdiction.
- 1.9.3. Wherever it becomes necessary to cut or interfere in any manner with existing apparatus for short periods of time, do Work at such times as agreed upon with the Owner and the Consultant.
- 1.9.4. If unscheduled disturbance to use of existing premises and services is required to complete Work, inform the Owner with advance notice of a minimum of 1 week. Provide information of requirements and perform Work at times directed by the Owner.
- 1.9.5. Make provisions to join new Work to existing and to install new supporting members, anchors and other items necessary for completion of Work. Provide temporary bracing where required.
- 1.9.6. Proceed with demolition of or alterations to any portion of existing building only after approval of the

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- Consultant has been obtained and after weather tight and dustproof screens have been erected to provide thorough protection to adjoining areas and rooms.
- 1.9.7. When permission has been granted to proceed with alterations in existing building, carry out Work expeditiously and continuously to completion.
- 1.9.8. Carry out Work so as to minimize dust migration. Protect items sensitive to and which could be damaged by dust. Where practical, keep demolition areas wetted.
- 1.9.9. During performance of Work, adequately protect Work completed and in progress, and existing work to remain, such as floors, finishes, trim and similar components, as completely as possible to minimize replacement of damaged Work by each Subcontractor and trade. Work damaged or defaced due to failure to provide adequate protection shall be repaired, or removed and replaced as directed by Consultant.
- 1.9.10. Properly coordinate Work of various sections and trades. Take into consideration existing installations to assure best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment and items, in available space. Under no circumstances will any extra payment be allowed due to failure by the Contractor to coordinate Work.
- 1.9.11. Remove, store and reinstall existing fixed equipment, fixtures and components which interfere with construction Work.
- 1.9.12. Cutting, patching and making good of existing work to accommodate new Work and requirements specified under other sections shall be done in conjunction with Work specified herein. Coordinate such Work.
- 1.9.13. Employ tradesmen qualified in Work being cut and patched to perform Work correctly and skillfully.
- 1.9.14. Do not undermine, damage or endanger existing structure, footings, foundations, pipe lines, electrical conduit and wiring by digging, cutting or any other operation in performance of Work of this Contract. Immediately repair and Make Good existing work so affected, including working after regular working hours, to the Consultant's approval, recommendation and satisfaction at no additional cost to the Owner.
- 1.9.15. Cut off, cap, divert or remove existing services in areas being altered which are affected by changes as required or as directed by municipal Authorities and utility company concerned and the Consultant. Protect and maintain active services to existing building.
- 1.9.16. Where new Work connects with existing and where existing work is altered, perform necessary cutting and fitting required to make satisfactory connections with existing work under this Contract, so as to leave entire Work in a finished condition. Match new Work exactly with existing work in material, form, construction and finish unless otherwise noted or specified. Make joining Work inconspicuous.
- 1.9.17. Make Good materials, surfaces, and finishes damaged or disturbed due to Work of this Contract.
- 1.9.18. Except where structural requirements are indicated on the Drawings, do not cut, drill or sleeve load bearing members without first obtaining the Consultant's written authorization for each condition.
- 1.9.19. Perform drilling of existing work carefully, leaving a clean hole no larger than required.
- 1.9.20. Make cuts clean and true with smooth edges. Fit units to tolerances established by existing work and in conformance with best standard practice for applicable class of Work.
- 1.9.21. Fill unused and unfilled sleeves and holes in non-fire rated floors and partitions not otherwise filled, by approved means. If unused sleeve is in fire or sound barrier, fill in manner to restore or maintain fire or sound barrier rating. Filling of openings in fire rated floors and partitions specified under Section 07 84 00 - Firestopping and Smoke Seals.
- 1.9.22. If non-designated and unclassified sprayed fire resisting, sound absorbing, or insulation applications are encountered, inform the Consultant for examination and instructions. Restore damaged non-asbestos
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- type fireproofing to original condition before covering with finishes.
- 1.9.23. Work shown on the Drawings, schedules and Specifications may or may not be all Work required to be done in existing building. Make Good and execute all necessary Work including incidentals to make a complete job of alterations Work.
- 1.9.24. Cutting and Patching - General:
- 1.9.24.1. Coordinate openings with Subcontractors to avoid unnecessary cutting and patching.
 - 1.9.24.2. Coordinate cutting and patching with Subcontractors to avoid unscheduled cutting and patching Work.
 - 1.9.24.3. Prior to cutting, sawing, breaking and core drilling provide integrated penetrating system to detect conduits, cables, pipes and similar items in suspended floor slabs and in walls where applicable. Carry out scanning to detect location of live power or energy transmitted from power source such as feeds for electric motors, compressors, heating and cooling systems prior to core drilling and sawing of typical slab on grade.
 - 1.9.24.4. Prior to cutting, sawing, breaking and core drilling through concrete, structural masonry and steel and load bearing members, including floors, ceilings, columns, beams and walls, obtain the Consultant's written acceptance.
 - 1.9.24.5. Execute cutting neatly and carefully, no larger than necessary, employing workers skilled in erection of the part of the Work being cut.
 - 1.9.24.6. Patch parts of the Work to match adjacent construction and finishes unless otherwise specified or indicated on the Drawings.
 - 1.9.24.7. Provide patching Products equal to existing finishes.
 - 1.9.24.8. Join new Work to existing in neat, accurate manner.
 - 1.9.24.9. Provide soundproof interior junctions.
 - 1.9.24.10. Design and provide permanent and temporary reinforcement and supports, as directed by the Consultant.
 - 1.9.24.11. Maintain fire separations and provide fire and smoke penetration sealants in cut and patched parts of the Work.
 - 1.9.24.12. Unless otherwise indicated in the Contract Documents, run piping, ducts and conduit in ceilings and furred spaces. Bury conduit in walls.
 - 1.9.24.13. Saw-cut floors, walls and ceilings accurately. Provide holes and openings no larger than necessary to minimize damage. Core drill circular holes in concrete. Accurately cut new openings for electrical outlets and other recessed items in walls.
 - 1.9.24.14. After cutting and patching is completed, re-finish surfaces to minimum 100 mm (4") outside patch perimeter, floor to ceiling and to nearest break in wall surfaces, such as inside and outside corners. Match patch finish to existing adjacent surfaces to completely conceal patch.
- 1.9.25. Cutting and Patching - Fire Separation Alterations:
- 1.9.25.1. Maintain fire separations for duration of the work of this Section.
 - 1.9.25.2. Provide fire and smoke penetration sealants at alterations and repairs in accordance with Section 07 84 00 - Firestopping And Smoke Seals.
 - 1.9.25.3. Provide continuous and solid framing, blocking or masonry work around service penetrations through fire separations in accordance with the fire penetration sealant design to
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maintain the continuity of the fire separation.

1.9.26. Cutting and Patching - Mechanical and Electrical Alterations:

- 1.9.26.1. Provide cutting and patching required for access to execute services alterations. Conceal capped services unless specifically indicated to remain exposed. Patch to conceal altered and capped services.
- 1.9.26.2. Provide cutting, e.g., core drilling of existing concrete and masonry walls and slabs, required to pass services through existing assemblies to accommodate alterations.

1.9.27. Removal of Flooring and Preparation of Substrate:

- 1.9.27.1. Remove flooring and adhesive/setting bed materials completely, down to concrete substrate.
- 1.9.27.2. Remove ridges and trowel marks and scrape substrate to a smooth level surface.
- 1.9.27.3. Fill new and existing depressions, dished areas, low spots, voids, gaps, cracks, joints, holes and other substrate defects with skim coat and self-leveling topping to achieve a flat substrate to within following tolerances:
 - 1.9.27.3.1. 3 mm (1/8") total maximum deviation +/- along a 3000 mm (10') straight edge applied omni-directionally over entire floor area.
- 1.9.27.4. Provide skim coats, primers and bonding agent slurries to neutralize residue adhesives and setting beds and to provide a suitable substrate to receive scheduled floorings.

1.9.28. Removal of Existing Carpet Adhesive and Setting Bed:

- 1.9.28.1. Prepare existing surface acceptable to the Consultant, suitable and compatible with subsequent applied underlayment or applied finish. Remove existing flooring and bases where indicated in the Drawings unless specified to be carried out under other sections. Remove carpet and adhesive/setting bed materials completely, down to concrete substrate. Prepare, mix and apply coats to neutralize residues adhesives and setting beds and to provide suitable substrate to receive scheduled flooring in accordance with manufacturer's instructions.
- 1.9.28.2. Shot blast existing concrete or prepare existing surfaces by or means acceptable to the Consultant. Level slabs as required to accommodate flooring with self-leveling underlayment to suit application. Grind existing concrete slab as required, clean surfaces and remove residue adhesives. Remove ridges and trowel marks and scrape substrate to a smooth level surface. Surfaces shall be clean, free of gouges, matter detrimental to bond of underlayment and flooring and be ready to receive underlayment and flooring. Prepare for flush application of new flooring material.
- 1.9.28.3. Fill new and existing depressions, dished areas, low spots, voids, gaps, cracks, joints, holes and other substrate defects with skim coat and self-leveling topping to achieve a flat substrate to within following tolerances: 3 mm (1/8") total maximum deviation +/- along 3000 mm (10') straight edge applied omni directionally over entire floor area.
- 1.9.28.4. Underlayment shall have compressive strength of 4000 psi after 28 Days and tolerance specified above.
- 1.9.28.5. Coordinate with substrate preparation specified in floor finish section.

1.9.29. Temporary Ceiling Removal:

- 1.9.29.1. Coordinate with electrical and mechanical trades to assess complete scope of temporary ceiling removals to allow for feeder runs and like by those sections (extent of ceiling removal has not been shown on architectural plans).

- 1.9.29.2. Provide temporary protection, signage and barriers to protect others.
- 1.9.29.3. Remove tile, panels and tee bar suspension from area required by other trades.
- 1.9.29.4. Upon completion of Work of other trades and all required inspections, replace tee-bar and acoustic tile. Where tile or tee-bar are damaged, bent, discoloured, scratched or otherwise appear of lesser quality than surrounding area, replace with new material.
- 1.9.29.5. Plaster ceilings in existing institution may be forming part of membrane fire separation having a fire resistance rating. Verify and maintain existing fire rating.
- 1.9.29.6. Remove and replace gypsum board bulkheads and ceilings in areas designated and as required. Make Good and match existing finishes.

1.10. CLEANING

1.10.1. Progress Cleaning:

- 1.10.1.1. Keep access areas to Work in tidy condition, free from accumulation of waste and debris during construction and on completion, other than caused by the Owner's crew or Other Contractors. Do not dispose of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways.
- 1.10.1.2. Keep Site and building, including concealed spaces, free from accumulation of dirt, debris, garbage and excess material. Remove oily rags and waste from premises at close of each Day Work is performed, or more often if required.
- 1.10.1.3. Remove rubbish and surplus materials promptly and dispose of in a legal manner. Do not allow scrap piles to accumulate. Do not permit fires.
- 1.10.1.4. Lower waste materials in a controlled manner with minimum handling; do not drop or throw materials from heights. Schedule cleaning operations so dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces. Sprinkle dusty debris with water.
- 1.10.1.5. Sweep adjacent roads and sidewalks daily to remove dirt and clods of earth deposited on adjacent public and private properties by construction traffic.
- 1.10.1.6. Vacuum-clean interior areas prior to start of finish Work, maintain areas free of dust and other contaminants during finishing operations.

1.10.2. Final Cleaning:

- 1.10.2.1. Prior to occupancy, clean the Place of the Work thoroughly, free of rubbish and surplus material. Dispose of rubbish and debris. Vacate the Place of the Work in a clean and tidy condition satisfactory to the Consultant.
- 1.10.2.2. Prior to cleaning, submit to the Consultant a complete list of manufacturers' cleaning/ maintenance instructions for all components of the Work.
- 1.10.2.3. Final finishing is in addition to and compatible with cleaning and finishing specified in Specification sections.
- 1.10.2.4. Clean new and existing components in accordance with manufacturers' recommendations including, but not limited to:
 - 1.10.2.4.1. Floors.
 - 1.10.2.4.2. tile/vinyl flooring: Sweep floor free of debris; clean corners and base

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- boards free of marks and dirt. Scrub new flooring using appropriate solutions to remove factory installed protective coatings. Strip existing flooring using appropriate chemical solution to remove any existing floor finish coating and base seal coatings. Apply to new and existing flooring 2 coats of sealer recommended by manufacturer of flooring materials. Let floor completely dry between coats. Use prime quality top line Products. Do not apply finish to baseboards.
- 1.10.2.4.3. vacuum carpet flooring using power brush equipped vacuum cleaner. Remove stains using approved stain removal methodology. Where carpet is exposed to extensive dry wall dust and other fine dust particles, carpet shall be pile lifted using rotary pile lifting machine. In addition, carpet shall be cleaned using extraction method approved by manufacturer.
- 1.10.2.4.4. walls shall be completely dusted and all marks removed. Where necessary wall shall be washed if painting is not an option.
- 1.10.2.4.5. ceilings.
- 1.10.2.4.6. window coverings.
- 1.10.2.4.7. doors, windows and frames.
- 1.10.2.4.8. exposed interior and exterior glazed surfaces.
- 1.10.2.4.9. hardware.
- 1.10.2.4.10. mechanical and electrical fixtures and equipment.
- 1.10.2.4.11. stainless steel, anodized aluminum, brass, bronze and other metals.
- 1.10.2.4.12. the Place of the Work outside building envelope: remove debris, rake sod, sweep sidewalks and pavement.
- 1.10.2.5. Use experienced cleaners or professional cleaners for final cleaning. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- 1.10.2.6. Final cleaning includes, without limitation, requirements specified herein, removal of surplus materials, tools, construction machinery and equipment from Site. Carry out final cleaning in accordance with manufacturer's instructions for each material. Clean the Work in accordance with applicable Specification sections and/or manufacturer's directions.
- 1.10.2.7. Remove stains, spots, marks, dust, smudges caused by Work within Work areas of this Contract. Vacuum, clean and buff resilient flooring.
- 1.10.2.8. Clean and polish interior glass, windows, entrances, skylights, mirrors, hardware, wall tile, stainless steel, chrome, porcelain, baked enamel, plastic laminate, mechanical, plumbing fixtures and electrical fixtures.

- 1.10.2.9. Vacuum clean and dust building interiors, behind grilles, louvres and screens. Vacuum clean ducts, fans, blowers and coils if units were operated without filters during construction.
- 1.10.2.10. Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- 1.10.2.11. Broom clean and wash interior as well as exterior walks, paved surfaces, concrete floors, steps and other similar surfaces.
- 1.10.2.12. Replace broken, damaged, disfigured or scratched glass and mirrors, which are part of Work.
- 1.10.2.13. Make Good any damage caused outside Work area. Includes doing necessary cleaning required due to Work.
- 1.10.2.14. Use appropriate apparatus and cleaning materials.
- 1.10.2.15. Close rooms and areas finished by cleaners, painters and decorators to all but authorized persons.
- 1.10.2.16. Upon completion of final cleaning, remove cleaning equipment, excess materials and debris from building and Site.

1.12. PROTECTING INSTALLED CONSTRUCTION

1.12.1. Protection of the Work during Construction:

- 1.12.1.1. Provide continuous protection to public, the Work, the Owner's property and adjacent property during construction. Protect Work of other trades from damage while performing subsequent Work.
- 1.12.1.2. Protect finished flooring from damage. Make special efforts and take measures when moving heavy loads or equipment over them. Keep floors free of oils, grime, grease or other materials likely to discolour them or affect bond of applied surfaces.
- 1.12.1.3. Protect, relocate and maintain existing, active services wherever they are encountered. Wherever inactive services are encountered, cap them off and remove unwanted portion, with approval of authorities having jurisdiction or public utility concerned in manner approved by them.
- 1.12.1.4. Adequately protect floors and roofs from damage. Take special measures when moving heavy loads or equipment on them.
- 1.12.1.5. Keep floors free of oils, grease or other materials likely to discolour them or affect bond of applied surfaces including fumes generated by temporary heating devices. Take care not to spill or allow oil, grease, gasoline, diesel and fuel oil, chemicals and other substances to contaminate soil or water on or adjacent to Site. Should such contamination accidentally occur report it immediately and clean up to satisfaction of the Consultant.
- 1.12.1.6. Protect Work of other sections from damage resulting from Work.
- 1.12.1.7. Damaged Work shall be made good at the Contractor's expense.
- 1.12.1.8. Protect glass and other finishes against heat, slag and weld splatter using suitable protective shields or covers.

- 1.12.1.9. Provide and maintain in working order, suitable Underwriters' labelled fire extinguishers and locate in suitable positions, to approval of authorities having jurisdiction.
- 1.12.1.10. Provide minimum of 3 safety helmets for the Consultant and any other authorized visitors to Site, if required.
- 1.12.1.11. Protect public and those employed on the Work from injury. Equipment (mobile) when not in use shall have keys removed and locked up in secure location.
- 1.12.2. Correction after Completion: In conformance with General Conditions of the Contract, Make Good any defects and deficiencies due to faulty materials or quality of performance that become apparent in the Work within 24 months from the date specified in Article A-6 of the Agreement between Owner and Contractor or for such longer period as specified for certain Products in the Contract Documents. Conform to requirements of the General Conditions of the Contract and provide Warranty for 24 months period and for extended period where applicable, in writing in an approved form acceptable to the Consultant signed by authorized official of the Contractor.

1.13. CLOSEOUT PROCEDURES

- 1.13.1. Final Site Review: the Consultant will perform final inspection in accordance with provisions under final Certificate for Payment. Conform to the *Construction Act*, R.S.O. 1990, c. C.30 for commencement, procedure and release of hold back fund. Lien period commencement, procedure and release of hold back monies will be in accordance with the *Construction Act*, R.S.O. 1990, c. C.30.
- 1.13.2. Takeover Procedure:
 - 1.13.2.1. Conform to requirements of following the General Conditions of Contract for take-over procedure:
 - 1.13.2.1.1. Comply also with recommended takeover procedures contained in OAA/OGCA Document No. 100, except as modified by the Contract Documents. In case of conflict with the Contract Documents conform to more stringent requirements. Procedure described consists of following stages:
 - 1.13.2.1.1.1. Stage 1 Contractor's Inspection for Substantial Performance
 - 1.13.2.1.1.2. Stage 2 Contractor's Application for Certificate of Substantial Performance
 - 1.13.2.1.1.3. Stage 3 Consultant's Certificate of Substantial Performance
 - 1.13.2.1.1.4. Stage 4 Consultant's Certificate for Payment of Holdback Monies
 - 1.13.2.1.1.5. Stage 5 Final Inspection for Completion of the Contract
 - 1.13.2.1.1.6. Stage 6 Warranty Period(s)
 - 1.13.2.2. All stages will be reviewed at first Coordination Site Meeting to ensure all parties understand their responsibilities.
- 1.13.3. Substantial Performance Review: Provide a written request to the Consultant for Substantial Performance review of the Work. Such request shall include a reconciliation of compliance with money test given in Clause 2 (1) (b) of the *Construction Act*, R.S.O. 1990, c. C.30 in addition to all documentation specified in the Contract Documents.
- 1.13.4. Certification of Substantial Performance: Certificate of Substantial Performance will be prepared by the Owner and provided to the Contractor for publication. The Contractor must comply with the requirements for application for Substantial Performance included in the General Conditions and Supplementary Conditions of the Contract.

1.13.5. Defect and Deficiency:

- 1.13.5.1. A defect is an item of the Work required by the Contract which has been installed but requires repair and/or replacement at a specific time.
- 1.13.5.2. A deficiency is an item of the Work required by the Contract which has not been installed or put into operating condition.
- 1.13.5.3. A warranty item is an item of the Work, installed under the Contract which manufacturer or installer agrees to maintain in, or restore to perfect condition for a specific period of time, after the Owner's acceptance of the Work as being substantially completed.
- 1.13.5.4. When, in the Consultant's opinion, the Work under the Contract is substantially complete and prior to final inspection by the Owner, a preliminary inspection shall be made at which time all defects and deficiencies shall be listed, taking care to distinguish between the two.

1.13.6. Deficiency Inspection:

- 1.13.6.1. Provide a written request to the Consultant for deficiency inspection of the Work. Such request shall include a statement by the Contractor that the Work to be reviewed by the Consultant for deficiencies is, to best of his knowledge, in compliance with the Contract Documents, reviewed Shop Drawings, samples and that all previously instructed corrections by the Consultant have been corrected.
- 1.13.6.2. Provide a schedule of planned deficiency inspections having regard to foregoing.

1.13.7. Deficiency Lists:

- 1.13.7.1. Neither the Owner's representatives, nor the Consultant will be responsible for issue of extensive lists of deficiencies. The Contractor assumes prime responsibility for ensuring items shown on the Drawings and described in the Specifications are completed. Any inspections to approve Certificates of Substantial Performance will be immediately canceled if it becomes obvious that extensive deficiencies are outstanding.
- 1.13.7.2. Promptly correct deficiencies noted by the Consultant. Do not proceed with installation of subsequent parts of the Work until deficiencies have been corrected. Every effort shall be made to ensure both defects and deficiencies are Made Good prior to final inspection.
- 1.13.7.3. Make Good deficiencies before the Contract is considered complete.

1.13.8. Notification of Correction of Deficiencies: Advise Consultant in writing, upon completion of rectification of deficiencies noted by the Consultant. Failure to provide such notification may be cause to withhold final payment.

1.13.9. Documents:

- 1.13.9.1. Within 21 Days of commencement of the Work, the Contractor shall make first submittal required by OAA/OGCA Document 100, Take-Over Procedures.
- 1.13.9.2. Submit documents in accordance with requirements of the Contract Documents.
- 1.13.9.3. Submit required documents along with request for certification of Substantial Performance of the Contract. Consultant's inspection for Substantial Performance of the Contract is not required until such submittal is received.

1.13.10. Final Inspection for Final Payment:

- 1.13.10.1. Final review of the Work shall constitute inspection precedent to issuance of final certificate of payment.
- 1.13.10.2. If there are any further deficiencies determined by this review, they shall be listed by the Consultant and provided to the Contractor. This list shall be recognized as final deficiency

list for purposes of acceptance of Work under the Contract.

1.13.10.3. Such deficiencies shall be corrected by a date mutually agreed upon between the Consultant and the Contractor, unless a specific date is required by Contract and a re-inspection by Consultant shall be called for by the Contractor following his own inspection to take place within 7 Days from date of request.

1.13.10.4. The Contractor shall thereafter submit its invoice for final payment.

1.13.11. End of Warranty Period Inspection:

1.13.11.1. At beginning of the 24th month from the date specified in Article A-13 of the Articles of Agreement and GC 12.3 of the General Conditions of the Contract the Owner, the Contractor and the Consultant, along with key Subcontractors as designated by the Consultant, carry out a complete inspection of building and its systems to determine which deficiencies are to be rectified under warranty.

1.13.11.2. Prior to completion of warranty period, arrange with the Consultant to carry out complete review of defects and deficiencies which have been observed during warranty period to determine which are to be corrected.

1.14. CLOSEOUT SUBMITTALS

1.14.1. Certificate of Substantial Performance:

1.14.1.1. Certificate of Substantial Performance will be prepared by the Owner and provided to the Contractor for publication. The Contractor must comply with the requirements for application for Substantial Performance included in the General Conditions and Supplementary Conditions of the Contract.

1.14.2. n/a

1.14.3. Pre-Start Health and Safety Review Reports (PSR): Submit all exemption documents or PSR reports prior to Substantial Performance of the Contract in accordance with Section 01 40 00 – Quality Requirements.

1.14.4. Product Record Documents:

1.14.4.1. Obtain from the Consultant and pay the cost for 1 copy of the Specifications and 1 set of white prints of the Contract Drawings at commencement of the Work and 10 Days prior to date of Substantial Performance of the Contract; Submit "as-built" Site set of white prints and the Specifications;

1.14.4.2. As Work progresses, clearly mark in a neat and legible form on Specifications and white prints significant changes and deviations from Contract Drawings and Specifications caused by Site conditions, additional instructions and Change Orders. Changes and deviations marked on as-built record Drawings and the Specifications by reference to other documents are not acceptable.

1.14.4.3. Have items relating to mechanical and electrical Work recorded by respective Subcontractor.

1.14.4.4. Print lettering and numbers in size to match original. Lines may be drawn free hand provided they are neat and accurate. Add "AS-BUILT RECORD" at each Drawing title block and on title page of the Specifications.

1.14.4.5. Record following changes and deviations on record Drawings:

1.14.4.5.1. depths of various elements of foundation in relationship to first floor level.

1.14.4.5.2. field changes of dimensions.

1.14.4.5.3. other significant deviations and changes which are concealed in

construction and cannot be identified by visual inspection.

1.14.4.5.4. show actual locations of following on record Drawings:

1.14.4.5.4.1. access doors and panels.

1.14.4.5.4.2. inverts of services at key points within building, at points where entering and leaving building, and at property lines. Dimension services in relation to structure and building grid lines.

1.14.4.5.4.3. duct work, piping, conduit, mechanical and electrical equipment and associated Work.

1.14.4.5.4.4. concealed piping, conduit, equipment and conveying systems, including such items provided for future use.

1.14.4.5.4.5. record following information on record Specifications:

1.14.4.5.4.5.1. Products, materials and other items selected from those specified.

1.14.4.5.4.5.2. approved substitutions and accepted alternatives.

1.14.4.5.4.5.3. other approved changes and deviations to items specified.

1.14.4.6. Have record Drawing white prints and Specifications available for inspection at all times.

1.14.5. Maintenance Instructions and Data Book: Provide the Consultant with 3 sets of operating and maintenance instructions and data books, 10 Days prior to advising the Consultant that Work is substantially performed which include:

1.14.5.1. Complete listing of Subcontractors' names, addresses and telephone numbers with notation as to which portions of the Contract have been provided by them.

1.14.5.2. Complete listing of materials, Products and equipment including serial numbers, manufacturer's names and sources of supply.

1.14.5.3. Description of each system, with description of each major component of systems.

1.14.5.4. Operation and installation instructions for each assembly, component and system.

1.14.5.5. Complete cleaning and maintenance instructions for each finish, assembly, component and system, including warnings of harmful practices.

1.14.5.6. Lists of spare parts for each assembly, component and system complete with names, addresses and telephone numbers of Suppliers.

1.14.5.7. Operating curves of mechanical and electrical equipment.

1.14.5.8. A lubrication schedule of all equipment.

1.14.5.9. Page-size Valve Tag Schedule and Flow Diagrams.

1.14.5.10. Water treatment procedures and tests.

1.14.5.11. Final balancing reports for mechanical systems.

- 1.14.5.12. Installation manual or installation instructions for each mechanical, electrical or architectural item, stamped and signed by Subcontractors submitting them.
- 1.14.5.13. Record Drawings of mechanical, electrical and special installations.
- 1.14.5.14. Final reviewed Shop Drawings
- 1.14.5.15. Copies of all warranties, properly executed.
- 1.14.5.16. Provide books consisting of 3-ring hard cover loose-leaf binders, indexed as to contents and identified on binding edges as "Maintenance Instructions and Data Book, for Contract No.: RFTC-1735-24". Ensure binders contain name of the Contractor and date of Substantial Performance of the Work.
- 1.14.5.17. Organize and label contents into applicable categories of Work, parallel to the Specification sections and provide a Table of Contents.
- 1.14.5.18. Use consistent terminology in books.
- 1.14.5.19. Submit maintenance and operation instructions which are manufacturer's latest published editions at date of submission.
- 1.14.5.20. Should any finish, Product or assembly be injured or damaged by faulty maintenance materials, practices not warned against in maintenance manual or by failure to provide proper maintenance manuals in time, rectify such damage or injury at no additional cost to the Owner.
- 1.14.6. Distribution System Diagrams: Prior to date of Substantial Performance of the Contract, submit framed single line diagrams of electrical distribution systems.

1.15. DEMONSTRATIONS FOR OWNER'S PERSONNEL

- 1.15.1. Provide qualified technicians to demonstrate operation and/or maintenance of systems to the Owner's staff.

1.16. PRODUCT WARRANTIES

- 1.16.1. Examine sections of the Specifications to ensure inclusion of warranties specified.
- 1.16.2. In addition to the requirements of Article A-13 of the Articles of Agreement and GC 12.3 of the General Conditions, the Contractor shall note extended warranty periods required by the Contract Documents for certain Products, systems and assemblies as specified under their respective sections.
- 1.16.3. Typical clause: Similar clause applies to trades listed herein as applicable:

"WARRANTY: Warrant the work of aluminum windows against defects and deficiencies in accordance with the General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include but are not limited to failure of system to remain completely weather tight, leaking in excess of specified tolerances and limits, deformation of members, failure of insulated glass units, glass breakage, condensation in excess of specified tolerances and limits, mechanical failure and discolouration of finishes."

1.16.4. Spare Parts:

- 1.16.4.1. Supply extra maintenance materials and/or spare parts and store in a locked room as directed by the Owner.

Extra Materials to be Submitted by the Contractor	
Material/Equipment	Quantity
Carpet Tiles	5 boxes (un-used)
Resilient Flooring	10 new tiles
Rubber Base	100 linear feet
Ceramic Tile used at back splash in the kitchen	20 extra tiles
Paint: • Main wall colour (white) • Accent Colour • Ceiling Paint	4 gallons (not opened) 2 gallons (not opened) 2 gallons (not opened)
Light Bulbs • LED tubes • LED Dimmable • LED Bulbs for pot lights	Ten (10) Ten (10) Five (5)
Ceiling Tiles	10 new ceiling tiles (un-cut)

- 1.16.4.2. Suitably package maintenance materials in accordance with manufacturer's instructions and label to identify Product type, manufacturer, Product name, colour number, dye lot and quantity.
- 1.16.4.3. Store maintenance materials, e.g., positioning, proper side up, etc., in accordance with manufacturer's recommendations.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- .1 The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- .1 This Section includes administrative and procedural requirements for the following:
 - 1. Recycling non-hazardous construction waste.
 - 2. Disposing of non-hazardous construction waste.

1.3 DEFINITIONS

- .1 Construction Waste: Building and Site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- .2 Demolition Waste: Building and Site improvement materials resulting from demolition or selective demolition operations.
- .3 Disposal: Removal off-Site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to Authorities Having Jurisdiction.
- .4 Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- .5 Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- .6 Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

- .1 General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of
 - .1 Construction Waste (including but not limited to):
 - .1 Concrete.
 - .2 Concrete reinforcing steel.
 - .3 Structural and miscellaneous steel.
 - .4 Glazing.
 - .5 Acoustical tile and panels.
 - .6 Supports and hangers.
 - .7 Wood Sheet Materials
 - .8 Rubber base
 - .9 Lumber.
 - .10 Metals.

- .11 Insulation.
- .12 Carpet and pad.
- .13 Gypsum board.

- .2 Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

- .1 Paper.
- .2 Cardboard.
- .3 Boxes.
- .4 Plastic sheet and film.
- .5 Polystyrene packaging.
- .6 Wood crates.
- .7 Plastic pails.

1.5 SUBMITTALS

- .1 Waste Management Plan: Submit 3 copies of the waste management plan within 7 Working Days of receipt of Notice to Commence the Work.
- .2 Waste Reduction Progress Reports: Reports are sent weekly tracking the volume sent out. Submit three copies of report. Include the following information:
 - .1 Generation point of waste.
 - .2 Total quantity of waste by volume.
 - .3 Quantity of waste salvaged, both estimated and actual in cubic meters.
 - .4 Quantity of waste recycled, both estimated and actual in cubic meters.
 - .5 Total quantity of waste recovered in cubic meters.
 - .6 Total quantity of waste recovered as a percentage of total waste.
 - .7 Waste Reduction Calculations: Before request for Substantial Performance of the Contract, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
 - .8 Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
 - .9 Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
 - .10 Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, volume receipts, and invoices.
 - .11 Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, volume tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

- .1 Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification

- .2 Regulatory Requirements: Comply with hauling and disposal regulations of Authorities Having Jurisdiction.
- .3 Waste Management Conference: Conduct conference at the Site to comply with requirements related to waste management including, but not limited to, the following:
 - .1 Review and discuss waste management plan.
 - .2 Review requirements for documenting quantities of each type of waste and its disposition.
 - .3 Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - .4 Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - .5 Review waste management requirements for each trade.

1.7 **WASTE MANAGEMENT PLAN**

- .1 General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by volume, but use same units of measure throughout waste management plan.
- .2 Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- .3 Waste Reduction Work Plan: List whether each load of waste will be recycled or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - .1 Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - .2 Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - .3 Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on project Site where materials separation will be located.
 - .4 Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 - .1 Total quantity of waste.
 - .2 Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 - .3 Total cost of disposal (with no waste management).
 - .4 Revenue from recycled materials.
 - .5 Savings in hauling and tipping fees by donating materials.
 - .6 Savings in hauling and tipping fees that are avoided.
 - .7 Handling and transportation costs. Include cost of collection containers for each type of waste.
 - .8 Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.4 RECYCLING CONSTRUCTION WASTE

- .1 Packaging:
 - .1 Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - .2 Polystyrene Packaging: Separate and bag materials.
 - .3 Pallets: As much as possible, require deliveries using pallets to remove pallets from project Site. For pallets that remain on-Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - .4 Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- .2 Wood Materials:
 - .1 Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - .2 Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.5 DISPOSAL OF WASTE

- .1 General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from project Site and legally dispose of them in a landfill or incinerator acceptable to Authorities Having Jurisdiction.
 - .1 Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-Site.
 - .2 Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- .2 Burning: Do not burn waste materials.
- .3 Disposal: Transport waste materials and dispose of at designated spoil areas on the Owner's property.
- .4 Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

PART 1 – GENERAL

1.1 Applicable Standards

- .1 2015 ASHRAE Handbook – HVAC Applications Chapter 43 HVAC Commissioning
- .2 ASHRAE Guideline 1.1 – 2007 – The HVAC&R Technical Requirements for the Commissioning Process
- .3 CSA Z320-11 (R2016) Building Commissioning Standard & Check Sheets

1.2 Description

- .1 Commissioning is a systematic process of ensuring that all building systems perform interactively according to the requirements of the Contract Documents and the Region's operational needs. The commissioning process begins in the design phase and continues through construction, acceptance and the warranty period. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, functional testing and training.
- .2 Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
 - .1 Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and industry best practices, and that they receive adequate operational checkout by installing Subcontractors;
 - .2 Verify and document proper performance of equipment and systems;
 - .3 Verify that Operations and Maintenance documentation left on Site is complete; and
 - .4 Verify that the Region's operating personnel are adequately trained.
- .3 The commissioning process does not take away from or reduce the responsibility of the system designers or the Contractor to provide a finished and fully functioning product.

1.3 Abbreviations

- .1 The following are common abbreviations used in the Commissioning Specifications and in the Commissioning Plan. Definitions are found in Section 1.8.

A/E-	Architect and Design Engineers (the "Consultant")	FT-	Functional performance test
CA-	Commissioning Authority	GC-	General Contractor, including its project manager (the 'Contractor')
CC	Controls Subcontractor	MC-	Mechanical Subcontractor
		PC-	Pre-functional checklists
Cx-	Commissioning	Subcontractors-	Subcontractors to GC
Cx Plan-	Commissioning Plan document	TAB-	Test and Balance Subcontractor
EC-	Electrical Subcontractor	FM	Facility Management
DDC-	Direct Digital Control	EMS-	Energy Management System

1.4 COORDINATION

- .1 Commissioning Team. The commissioning team consists of the representatives from the Region, the Facility Management (FM) Staff, Commissioning Authority (CA), the General Contractor (GC or Contractor), the Architect and Design Engineers (A/E) (the “Consultant”), the mechanical Subcontractor (MC), the Electrical Subcontractor (EC), the Testing and Balancing (TAB) Subcontractor, the Controls Subcontractor (CC), any other installing subcontractors or suppliers of equipment.
- .2 Management. The CA is hired by the Region and follows the rules of an Independent Commissioning Authority. The CA directs and coordinates the commissioning activities and reports to the Region. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.
- .3 Scheduling. The CA will work with the Region and GC to schedule the commissioning activities. The CA will provide sufficient notice to the Region and GC for scheduling commissioning activities. The GC shall integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process. The CA will work with the GC to provide the initial schedule of primary commissioning events at the commissioning scoping meeting. The Commissioning Plan provides a format for this schedule. As construction progresses more detailed schedules are developed by the GC and the CA. The Commissioning Plan also provides a format for detailed schedules.

1.5 COMMISSIONING PROCESS

- .1 Commissioning Plan. The commissioning plan provides guidance in the execution of the commissioning process. Following the commissioning scoping meeting, the CA will update the plan which is then considered the “final” plan, though it will continue to evolve and expand as the project progresses. The Specifications will take precedence over the Commissioning Plan.
- .2 Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
 - .1 Commissioning during construction begins with a scoping meeting conducted by the CA where the commissioning process is reviewed with the commissioning team members.
 - .2 Additional meetings will be required throughout construction, scheduled by the CA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
 - .3 Equipment documentation is submitted to the CA during normal submittals, including detailed start-up procedures and Shop Drawings.
 - .4 The CA works with the Subcontractors in developing startup plans and startup documentation formats, including providing the Subcontractors with pre-functional test sheets to be completed during the startup process.
 - .5 In general, the checkout and performance verification proceeds from simple to complex; from component level, to equipment, to systems, and finally intersystem levels with pre-functional test sheets being completed before functional testing.
 - .6 The Subcontractors, under their own direction, execute and document the pre-functional test sheets and perform startup and initial checkout. The CA documents that the test sheets and startup were completed according to the approved plans. This may include the CA witnessing start-up of selected equipment.
 - .7 The CA develops specific equipment and system functional performance test procedures with the assistance of Subcontractors as required. The Subcontractors review the test procedures once prepared.

- .8 The procedures are executed by the Subcontractors, under the supervision of, and documented by the CA.
- .9 Items of non-compliance in material, installation or setup are corrected at the Subcontractor's expense and the system retested.
- .10 The CA reviews the O&M documentation for completeness.
- .11 Commissioning is completed before Substantial Performance of the Contract.
- .12 Deferred testing is conducted, as specified or required.

1.6 RELATED WORK

- .1 Specific commissioning requirements are given in the following Sections of these Specifications. All of the following sections apply to the Work of this Section.

01 91 00	Commissioning	<i>Describes the commissioning process, responsibilities common to all parties, responsibilities of the Consultant, CA, GC and Suppliers, focusing on the CA. The unique MC, CC, TAB and EC (including the Subcontractors for the Special Systems) responsibilities are included in Divisions 21, 22, 23, 25, 26, and 28.</i>
21 08 00	Fire Suppression System Cx	<i>Describes the Cx responsibilities of the Fire Protection, Plumbing, Mechanical, TAB and Controls Contractors and the pre-functional testing and startup responsibilities of each. Points to 01 91 00 for functional testing requirements and provides the pre-functional and the specific functional testing requirements for Division 21, 22, 23 and 25 equipment, for use on this project.</i>
22 08 00	Plumbing Cx	
23 08 00	HVAC Cx	
25 08 00	Integrated Automation Cx	
26 08 00	Electrical Cx	<i>Describes the specific Cx responsibilities of the Division 26 Subcontractor.</i>

1.7 RESPONSIBILITIES

- .1 General: General Commissioning Responsibilities are as follows:
 - .1 The responsibilities of various parties in the commissioning process are provided in this Section. The responsibilities of the mechanical Subcontractor and TAB are in Division 23 and controls Subcontractor are in Division 25; those of the electrical Subcontractor in Division 26, and Electronic Safety and Security in Division 28. The Contractor is not responsible for providing services covered under other parties' scope; their responsibilities are listed here to clarify the commissioning process.
- .2 All Parties: Commissioning responsibilities for all parties are as follows:
 - .1 Attend commissioning scoping meeting and additional meetings, as necessary.
- .3 Architect (of the Consultant): Commissioning responsibilities of the Architect are as follows:
 - .1 Attend the commissioning scoping meeting and selected commissioning team meetings.
 - .2 Perform normal submittal review, construction observation, As-Built Drawing preparation, O & M manual preparation, etc., as contracted.

- .3 Provide any design narrative documentation requested by the CA.
 - .4 Coordinate resolution of system deficiencies identified during commissioning, according to the Contract Documents.
 - .5 Prepare and submit final as-built design intent documentation for inclusion in the O&M manuals. Review the O&M manuals.
 - .6 Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.
- .4 Mechanical and Electrical Designers/Engineers (of the Consultant): Commissioning responsibilities of the Mechanical and Electrical Engineers are as follows:
- .1 Perform normal submittal review, construction observation, As-Built Drawing preparation, etc., as contracted. One Site observation should be completed just prior to system startup.
 - .2 Provide any design narrative and sequences documentation requested by the CA. The Designers shall assist (along with the GC and/or Subcontractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
 - .3 Attend commissioning scoping meetings and other selected commissioning team meetings.
 - .4 Participate in the resolution of system deficiencies identified during commissioning, according to the Contract Documents.
 - .5 Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review the O&M manuals.
 - .6 From the Contractor's red-line drawings, edit and update one-line diagrams developed as part of the design narrative documentation and those provided by the vendor as Shop Drawings for the chilled and hot water, condenser water, domestic water, steam and condensate systems; supply, return and exhaust air systems and emergency power system.
 - .7 Provide a presentation at one of the training sessions for the Region's personnel.
 - .8 Witness testing of selected pieces of equipment and systems.
 - .9 Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.
- .5 Commissioning Authority (CA): Commissioning Responsibilities of the Commissioning Authority are as follows:
- .1 The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the General Contractor and the Consultant. The primary role of the CA is to develop and coordinate the execution of a testing plan, observe and document performance that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The GC and/or Subcontractors will provide all tools or the use of tools to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CA.

- .2 Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
- .3 Coordinate the commissioning work and, with the GC ensure that commissioning activities are being scheduled into the master schedule.
- .4 Develop and issue the Commissioning Plan.
- .5 Plan and conduct a commissioning scoping meeting and other commissioning meetings.
- .6 Before startup, review the current control sequences and interlocks and work with the GC and Subcontractors and Design Engineers until sufficient clarity has been obtained, in writing, to be able to write detailed functional testing procedures.
- .7 Review submittals provided by the GC and Subcontractors applicable to systems being commissioned for compliance with commissioning needs, concurrent with the Consultant reviews. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
- .8 Write and distribute pre-functional tests and test sheets.
- .9 Develop an enhanced start-up and initial systems checkout plan with Subcontractors.
- .10 Perform Site visits, as necessary, to observe component and system installations. Attend selected planning and Site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
- .11 Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Notify the Region of any deficiencies in results or procedures.
- .12 Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Notify the Region of any deficiencies in results or procedures.
- .13 Approve pre-functional tests and checklist completion by reviewing pre-functional checklist reports and by selected Site observation and spot checking.
- .14 Approve systems start-up by reviewing start-up reports and by selected Site observation.
- .15 Review TAB execution plan.
- .16 Oversee sufficient functional testing of the control system and approve it to be used for TAB, before TAB is executed.
- .17 Review air and water systems balancing by spot testing, by reviewing completed reports, and by selected Site observation.
- .18 With necessary assistance and review from installing Subcontractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone data-logger monitoring, or manual functional testing.
- .19 Analyze any functional performance trend logs and monitoring data to verify performance.
- .20 Coordinate, witness and approve manual functional performance tests performed by installing Subcontractors. Coordinate retesting as necessary until satisfactory performance is achieved. Perform actual functional testing with Subcontractors on equipment so specified in Section 01 91 00 sub-section 1.9.

- .21 Maintain a master deficiency and resolution log and a separate testing record. Provide the Region with written progress reports and test results with recommended actions.
- .22 Witness performance testing of smoke control systems by others and all other Region contracted tests or tests by manufacturer's personnel over which the CA may not have direct control. Document these tests and include this documentation in Commissioning Binders.
- .23 Review equipment warranties to ensure that the Region's responsibilities are clearly defined.
- .24 Oversee and approve the training of the Region's operating personnel. Compile and maintain a commissioning record book(s).
- .25 Review the preparation of the O&M manuals. Provide a final commissioning report (as described in this Section).
- .26 Develop a Systems Operating Manual.
- .27 Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
- .28 Return to the Site at 20 months into the 24 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.
- .6 Contractor/Project Manager (PM): Commissioning Responsibilities of the Contractor/Project Manager are as follows:
 - .1 Facilitate the coordination of the commissioning work by the CA, and ensure that commissioning activities are being scheduled into the master schedule.
 - .2 Review the final Commissioning Plan.
 - .3 Attend a commissioning scoping meeting and other commissioning team meetings.
 - .4 Include the cost of commissioning in the total Contract Price submitted in the Contractor's bid.
 - .5 Perform the normal review of the Contractor's submittals.
 - .6 Furnish a copy of all construction documents, addenda, change orders and approved submittals and Shop Drawings related to commissioned equipment to the CA.
 - .7 In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
 - .8 Ensure that all Subcontractors execute their commissioning responsibilities according to the Contract Documents and schedule.
 - .9 Observe and witness pre-functional test sheets, startup and functional testing.
 - .10 Review commissioning progress and deficiency reports.
 - .11 Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.
 - .12 Sign-off on individual commissioning tests as completed and passing.

- .13 Coordinate the training of Region personnel.
 - .14 Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Final Commissioning Program.
 - .15 Assist the CA as necessary in the seasonal or deferred testing and deficiency corrections required by the specifications.
 - .16 Ensure that Subcontractors execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
 - .17 Ensure that Subcontractors correct deficiencies and make necessary adjustments to O&M manuals and As-Built Drawings for applicable issues identified in any seasonal testing.
- .7 Equipment Suppliers: Commissioning Responsibilities of the Equipment Suppliers are as follows:
- .1 Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Region to keep warranties in force.
 - .2 Assist in equipment testing per agreements with Subcontractors, which may include factory tests and the development of associated reports.
 - .3 All costs associated with provision of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents shall be included in the total Contract Price submitted in the Contractor's bid, except for stand-alone data-logging equipment that may be used by the CA.
 - .4 Through the Contractors to which products are supplied, analyze specified products and verify that the Consultant has specified the newest most updated equipment reasonable for this project's scope and budget.
 - .5 Provide information requested by CA regarding equipment sequence of operation and testing procedures.
 - .6 Review test procedures for equipment installed by factory representatives.

1.8 DEFINITIONS

The following definitions apply to this Section in addition to the defined term included in the Definitions Section of the Contract:

- .1 Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.
- .2 Basis of Design - The basis of design is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The basis of design describes the systems, components, conditions and methods chosen to meet the intent. The basis of design is the technical response to the design intent.
- .3 Commissioning Authority (CA) – The CA works independent of the design and constructions teams. The CA directs and coordinates the day-to-day commissioning activities. The CA does not take an oversight role like the Contractor. The CA is part of the Region's project team or shall report directly to the Region.
- .4 Commissioning Plan - an overall plan that provides the structure, schedule and coordination planning for the commissioning process.
- .5 Control system - the central building energy management control system.

- .6 Direct Digital Control (DDC) – Automated building control utilizing analog or digital signals to building controllers, actuators, valves, sensors, and other HVAC control related components
- .7 Data-logging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data-loggers separate from the control system.
- .8 Deferred Functional Tests – FT's that are performed later, after achieving Substantial Performance of the Contract, due to partial occupancy, equipment, seasonal requirements, design or other Site conditions that disallow the test from being performed.
- .9 Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not compliant with the design intent).
- .10 Design Narrative or Design Documentation - sections of either the Design Intent or Basis of Design.
- .11 Energy Management System (EMS) – an integrated software system that collects, logs and displays data from sources of energy use
- .12 Factory Testing - testing of equipment on Site or at the factory by factory personnel with a Region representative present.
- .13 Functional Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB Subcontractor's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing Subcontractor or vendor. FTs are performed after pre-functional test sheets and startup are complete.
- .14 Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- .15 Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data-loggers or the trending capabilities of control systems.
- .16 Non-Compliance - see Deficiency.
- .17 Non-Conformance - see Deficiency.
- .18 Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal."
- .19 Region-Contracted Tests - tests paid for by the Region outside the GC's Contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.
- .20 Phased Commissioning - commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.

- .21 Pre-functional Checklist (PC) - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CA to the Sub. Pre-functional test sheets are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels satisfactory, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). Pre-functional refers to before functional testing and shall be completed by the installing Subcontractor. Pre-functional test sheets augment and are combined with the manufacturer's start-up checklist. The CA may choose to witness pre-functional tests for large/critical pieces of equipment.
- .22 Project Manager (PM) - the General Contractor's representative in the day-to-day activities of construction.
- .23 Sampling - functionally testing only a fraction of the total number of identical or near identical pieces of equipment. Refer to Section 01 91 00, Part 3.5.9.8 for details.
- .24 Seasonal Performance Tests - FT's that are deferred until the system(s) will experience conditions closer to their design conditions.
- .25 Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).
- .26 Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and Direct Digital Control (DDC) system to simulate a sensor value.
- .27 Startup - the initial starting or activating of dynamic equipment, including executing pre-functional test sheets.
- .28 Test Procedures - the step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CA.
- .29 Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents (Sections 25 08 00 and 26 08 00)
- .30 Trending - monitoring using the building control system.
- .31 Vendor - supplier of equipment.
- .32 Warranty Period - warranty period for entire project as set out in Article A-13 of the Articles of Agreement and GC 12.3 of the General Conditions, including equipment components.

1.9 SYSTEMS TO BE COMMISSIONED

- .1 Systems to be commissioned have been detailed below:
 - .1 Building Automation System – For Equipment/Systems in scope of work only
 - .2 Fan Coil Units
 - .3 Valves
 - .4 Air Handling Units
 - .5 Humidifiers
 - .6 Lighting and Lighting Controls

PART 2- PRODUCTS

2.1 Test Equipment

- .1 The Contractor shall ensure that all standard testing equipment required to perform startup and initial checkout and required functional performance testing be provided by the GC or Division Subcontractor for the equipment being tested. For example, the HVAC Subcontractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls systems except for equipment specific to and used by TAB in their commissioning responsibilities.
- .2 All costs associated with the special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the total Contract Price submitted by the Contractor in its Bid, except for stand-alone datalogging equipment that may be used by the CA.
- .3 Data-logging equipment and software required to test equipment will be provided by the CA, but shall not become the property of the Region.
- .4 All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.28°C (0.5°F) and a resolution of $\pm 0.056^{\circ}\text{C}$ (0.1°F). Pressure sensors shall have an accuracy of $\pm 2.0\%$ of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3- EXECUTION

3.1 Meetings

- .1 The CA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CA. Information gathered from this meeting will allow the CA to create the Commissioning Plan to its "final" version, which will also be distributed to all parties.
- .2 Miscellaneous Meetings. Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Subcontractors. The CA will plan these meetings and will minimize unnecessary time being spent by Subcontractors.

3.2 Reporting

- .1 The CA will provide regular reports to the Contractor and the Region, depending on the management structure, with increasing frequency as construction and commissioning progresses. Standard forms are provided and referenced in the Commissioning Plan.
- .2 The CA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.
- .3 Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.
- .4 A final summary report developed by the CA will be provided to the Contractor and the Region, focusing on evaluating commissioning process issues and identifying areas where the process could be improved. Pre-functional test sheets and functional tests will not be part of the final report.

3.3 Submittals

- .1 The Contractor and its Subcontractors shall provide the CA standard submittals required to facilitate the commissioning work. This process will be integrated into the normal submittal process and protocol of the construction team. At a minimum, the submittals will include equipment Shop Drawings, the manufacturer's printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings, and details of Region contracted tests. In addition, the installation and checkout materials that are shipped inside the equipment and the field checkout forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority. The Contractor shall ensure that all documentation requested by the CA is included by the Subcontractors in their O&M manual contributions.
- .2 The Commissioning Authority will review submittals related to the commissioned equipment for conformance to Region's project requirements as they relate to the commissioning process.
- .3 The CA may request additional design narrative from the Consultant and controls Subcontractor, depending on the completeness of the design intent documentation and sequences provided with the Specifications.
- .4 These submittals to the CA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the CA will review them.

3.4 Start-up, Pre-Functional Test Sheets and Initial Checkout

- .1 The following procedures apply to all equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery (e.g. electrical system power quality) may have very simplified PCs and startup.
 - .1 General. Pre-functional test sheets are a critical commissioning piece in order to ensure functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full pre-functional checkout. No sampling strategies are used. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
 - .2 Start-up and Initial Checkout Plan. The CA shall assist the commissioning team members responsible for startup of any equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for pre-functional test sheets and startup are identified in the commissioning scoping meeting and in the checklist forms. The parties responsible for executing functioning performance testing are detailed in specific commissioning specification sections (refer to Section 01 91 00 subsection 1.6 of this document for details).
 - .3 Pre-functional test scripts are provided by the CA to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.
 - .4 The Contractor shall ensure that the Subcontractor responsible for the purchase of the equipment develops the full start-up plan by combining (or adding to) the CA's test sheets with the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include test sheets and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan. The full start-up plan could consist of something as simple as:

- .1 The CA's pre-functional test sheets.
- .2 The manufacturer's standard written start-up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
- .3 The manufacturer's normally used field checkout sheets.
- .5 The Contractor submits the full startup plan to the CA for review.
- .6 The CA reviews the procedures and the format for documenting them, noting any procedures that need to be added.
- .7 The full start-up procedures and the approval form may be provided to the Contractor for review depending on management protocol.
- .2 Sensor and Actuator Calibration:
 - .1 All field-installed temperature, relative humidity, CO/CO₂, and pressure sensors/gauges, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used, if accepted by the Region in advance. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
 - .2 All procedures used shall be fully documented on the pre-functional test sheets or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
- .3 Sensor Calibration Methods:
 - .1 All Sensors verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure.
 - .2 Sensors Without Transmitters--Standard Application. Make a reading with a calibrated test instrument within 6 inches of the Site sensor. Verify that the sensor reading (via the permanent thermostat, gage or Building Automation System (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
 - .3 Sensors With Transmitters--Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the Site sensor. Verify that the sensor reading (via the permanent thermostat, gage or BAS) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.
- .4 Tolerances, Standard Applications

Sensor	Required Tolerance [+/-]	Sensor	Required Tolerance (+/-)
Cooling coil, chilled and condenser water temps	0.22°C (0.4°F)	Flow rates, water	4% of design
AHU wet bulb or dew point	1.11°C (2.0°F)	Relative humidity	4% of design
Hot water coil and boiler water temp	0.83°C (1.5°F)	Combustion flue temps	2.78°C (5.0°F)
Outside air, space air, duct air temps	0.22°C (0.4°F)	Oxygen or CO ₂ monitor	0.1 % pts
Watt hour, voltage & amperage	1% of design	CO monitor	0.01 % pts
Pressures, air, water and gas	3% of design	Natural gas and oil flow rate	1% of design
Flow rates, air	10% of design	Steam flow rate	3% of design
		Barometric pressure	338.639 Pa (0.1 in. of Hg)

.5 Valve and Damper Stroke Setup and Check:

- .1 EMS Readout For all valve and damper actuator positions checked, verify the actual position against the BAS readout. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- .2 Closure for heating coil valves (NO): Set heating setpoint 11.11°C (20°F) above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 11.11°C (20°F) below room temperature. Observe the valve close. Restore to normal.
- .3 Closure for cooling coil valves (NC): Set cooling setpoint 11.11°C (20°F) above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 11.11°C (20°F) below room temperature. Observe valve open. Restore to normal.

.6 Execution of Pre-functional Test Sheets and Startup:

- .1 The Contractor shall ensure that, a minimum of 28 Days prior to startup, the Subcontractors and vendors schedule startup and checkout with the Contractor and CA. The performance of the pre-functional test sheets, startup and checkout are directed and executed by the Sub or vendor. When checking off pre-functional test sheets, signatures may be required of other Subcontractors for verification of completion of their work.
- .2 The CA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, (in which case a sampling strategy may be used as accepted by the PM).
- .3 For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CA shall observe a sampling of the pre-functional and start-up procedures.
- .4 The Contractor shall ensure that the Subcontractors and vendors execute startup and provide the CA with a signed and dated copy of the completed start-up and pre-functional tests and test sheets.

- .5 Only individuals that have direct knowledge and witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.
- .7 Deficiencies, Non-Conformance and Approval in Test Sheets and Startup:
 - .1 The Contractor shall ensure that the Subcontractors clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CA within two days of test completion.
 - .2 The CA reviews the report and submits either a non-compliance report or an approval form to the Region. The CA shall work with the Subcontractors and vendors to correct and retest deficiencies or uncompleted items. The CA will involve the Contractor and others as necessary. The Contractor shall ensure that the installing Subcontractors or vendors correct all areas that are deficient or incomplete in the test sheets and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CA recommends approval of the execution of the test sheets and startup of each system to the Contractor using a standard form.

3.5 Functional Testing

- .1 This sub-section applies to all commissioning functional testing for all divisions.
- .2 Systems to be Commissioned: The list of equipment to be commissioned is detailed in specific commissioning specification sections (refer to Section 01 91 00 subsection 1.6 of this document for details).
- .3 Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
- .4 In general, each system should be operated by the Contractor through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response and from the approved Shop Drawings. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
- .5 Development of Test Procedures: Before test procedures are written, the CA shall obtain all requested documentation and a current list of Change Orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements in specific commissioning specification sections (refer to Section 01 91 00 subsection 1.6 of this document for details), the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. The Contractor shall ensure that each Sub or vendor responsible to execute a test provides limited assistance to the CA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CA shall provide a copy of the test procedures to the Sub(s) who shall review the tests for feasibility, safety, equipment and warranty protection. The CA may submit the tests to the Consultant for review, if requested.
- .6 The CA shall review Region-contracted, factory testing or required Region acceptance tests which the CA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.

- .7 The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
- .8 The test procedure forms developed by the CA shall include (but not be limited to) the following information:
 - .1 System and equipment or component name(s)
 - .2 Equipment location and ID number
 - .3 Date
 - .4 Project name
 - .5 Participating parties
 - .6 A copy of the specification section describing the test requirements
 - .7 A copy of the specific sequence of operations or other specified parameters being verified
 - .8 Required pre-test field measurements (filled-up pre-functional tests)
 - .9 Instructions for setting up the test.
 - .10 Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
 - .11 Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
 - .12 A section for comments
 - .13 Signatures and date block for the CA and all participating parties.
- .9 Test Methods:
 - .1 Test Execution Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data-loggers. The CA may substitute specified methods or require an additional method to be executed, other than what was specified, with the approval of the Region. This may require a change order and adjustment in charge to the Region. The CA will determine which method is most appropriate for tests that do not have a method specified.
 - .2 Simulated Conditions Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
 - .3 Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
 - .4 Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

- .5 Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.
 - .6 Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during pre-functional testing.
 - .7 Setup: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Contractor shall ensure that the Subcontractor executing the test provides all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Subcontractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
 - .8 Sampling: Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subcontractors is allowed in pre-functional checklist execution.

A common sampling strategy referenced in the Specifications as the “xx% Sampling—yy% Failure Rule” is defined by the following example.

xx = the percent of the group of identical equipment to be included in each sample.

yy = the percent of the sample that if failing, will require another sample to be tested.

The example below describes a 20% Sampling—10% Failure Rule.
 - .9 Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
 - .10 If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
 - .11 If 10% of the units in the second sample fail, test all remaining units in the whole group.
 - .12 If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification as determined by the CA, the CA may stop the testing and require the responsible Subcontractor to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.
- .10 Coordination and Scheduling:
- .1 The Subcontractors shall provide sufficient notice to the CA regarding their completion schedule for the pre-functional test sheets and startup of all equipment and systems. The CA will schedule functional tests through the Contractor and affected Subcontractors. The CA shall direct, witness and document the functional testing of all equipment and systems. The Contractor shall ensure that the Subcontractors execute the tests.

- .2 In general, functional testing is conducted after pre-functional testing and startup has been satisfactorily completed. The control system is sufficiently tested and approved by the CA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
- .11 Test Equipment.: Refer to Section 01 91 00, Part 2 for test equipment requirements.
- .12 Problem Solving: The CA will recommend solutions to problems found, however it is the responsibility of the Subcontractors, and the GC to solve, correct and retest problems.

3.6 Documentation, Non-Conformance and Approval of Tests

- .1 Documentation: The CA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the Contractor and its Subcontractors for review. The CA will include the filled out forms in the Commissioning Binders.
- .2 Non-Conformance:
 - .1 All deficiencies or non-conformance issues shall be noted and reported to the Region on a standard non-compliance form.
 - .2 Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases the deficiency and resolution will be documented on the procedure form.
 - .3 Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues.
 - .4 As tests progress and a deficiency is identified, the CA discusses the issue with the executing contractor.
 - .1 When there is no dispute on the deficiency and the Subcontractor accepts responsibility to correct, the following course of action occurs:
 - .2 The CA documents the deficiency in deficiency tracking log and issues to the Project Team. The Sub corrects the issue and signs off on the deficiency tracking log indicating the issue has been resolved.
 - .3 The CA reschedules the test and the test is repeated. If the test is successful, the CA closes the item.
 - .5 If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - .1 The deficiency shall be documented on the deficiency tracking log with the Subcontractor's response and a copy given to the Contractor and to the Subcontractor representative assumed to be responsible.
 - .2 Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the Consultant. Final acceptance authority is with the Region.
 - .3 The CA documents the resolution process.

- .4 Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs off on the deficiency tracking log and provides it to the CA. The CA reschedules the test and the test is repeated until satisfactory performance is achieved, at which time the CA closes the item.
- .6 Cost of Retesting:
 - .1 The cost for the Sub to retest a pre-functional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC. The Region shall not be responsible for any costs associated with retesting due to a deficiency caused by the GC or a Subcontractor.
 - .2 For a deficiency identified, not related to any pre-functional checklist or start-up fault, the following shall apply: The CA and the Contractor will direct the retesting of the equipment once at no “charge” to the GC for their time.
 - .3 Refer to the sampling section of Section 01 91 00, Part 3.5 for requirements for testing and retesting identical equipment.
- .7 The Contractor shall respond in writing to the CA and the Region at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
- .8 The CA retains the original deficiency tracking log until the end of the project.
- .9 Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- .3 Approval:
 - .1 The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CA and by the Region, if necessary. The CA recommends acceptance of each test to the Region using a standard form. The Region gives final approval on each test using the same form, providing a signed copy to the CA and the Contractor.

3.7 Operation and Maintenance Manuals

- .1 The specific content and format requirements for the standard O&M manuals are detailed in Mechanical and Electrical Specifications by the Contractor.
- .2 Consultant Contribution: The Consultant will include in the beginning of the O&M manuals a separate section describing the systems including:
 - .1 The design intent narrative prepared by the Consultant and provided as part of the Contract Documents, updated to as-built status by the Consultant. These documents will be provided to the Contractor at time of Substantial Performance of the Contract.
 - .2 Simplified professionally drawn single line system diagrams on 215.9mm x 279.4mm (8 ½” x 11”) or 279.4mm x 431.8mm (11” x 17”) sheets. These shall include chilled water system water system, heating system, steam system, supply air systems, exhaust systems, domestic hot water and electrical single lines. These shall show major pieces of equipment.

- .3 CA Review Prior to Substantial Performance of the Contract, the CA shall review the O&M manuals, documentation and redline as-builts for systems that were commissioned and to verify compliance with the Specifications. The CA will communicate deficiencies in the manuals to the Region or Consultant, as requested. Upon a successful review of the corrections, the CA recommends acceptance of these sections of the O&M manuals to the Region or Consultant. The CA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the Consultant's review of the O&M manuals.

3.8 Training of Region Personnel

- .1 The GC shall be responsible for training coordination and scheduling, and ultimately for ensuring that training is completed.
- .2 The CA shall interview the facility manager and Consultant to determine the special needs and areas where training will be most valuable. The Region and CA shall decide how rigorous the training should be for each piece of commissioned equipment. The CA shall communicate the results to the Subcontractors and vendors who have training responsibilities.
- .3 In addition to these general requirements, the detailed training requirements of the Region personnel by Subcontractors and vendors is detailed in specific commissioning specification sections (refer to Section 01 91 00 Subsection 1.6 of this document for details).
- .4 Each Sub and vendor responsible for training will submit a written training plan to the CA for review and approval prior to training. The plan will cover the following elements:
 - .1 Equipment (included in training)
 - .2 Intended audience
 - .3 Location of training
 - .4 Objectives
 - .5 Subjects covered (description, duration of discussion, special methods, etc.)
 - .6 Duration of training on each subject
 - .7 Instructor for each subject
 - .8 Methods (classroom lecture, video, Site walk-through, actual operational demonstrations, written handouts, etc.)
 - .9 Instructor and qualifications
- .5 For the primary HVAC equipment, the controls Subcontractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
- .6 The CA develops an overall training plan and coordinates and schedules, with the Region, the overall training for the commissioned systems. The CA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CA recommends approval of the training to the Region using a standard form. The Region will also sign the approval form.
- .7 The Mechanical and Electrical Design Engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, heating systems, air distribution system, control system strategies, electrical distribution, fire systems, etc.

3.9 Deferred Testing

- .1 Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of test sheets and functional testing may be delayed upon approval of the Region. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.
- .2 Seasonal Testing During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate Subcontractors, with facilities staff and the CA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing will be made.

3.10 WRITTEN WORK PRODUCTS

- .1 The commissioning process generates a number of written work products described in various parts of the Specifications. The Commissioning Plan lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them and the location of the specification to create them. In summary, the written products are:

<u>Product</u>	<u>Developed By</u>
1. Final commissioning plan	CA
2. Commissioning Meeting Minutes	CA
3. Commissioning Schedule	CA with GC
4. Equipment documentation submittals	Subcontractors
5. Sequence clarifications	Subcontractors and A/E as needed
6. Pre-functional test sheets	CA
7. Startup and initial checkout plan	Subcontractors and CA (compilation of existing documents)
8. Startup and initial checkout forms filled out	Subcontractors
9. Final TAB report	TAB Subcontractor
10. Issues log (deficiencies)	CA
11. Commissioning Progress Record	CA
12. Functional test forms	CA
13. Filled out functional tests	CA
14. O&M manuals	Subcontractors
15. Final Commissioning Documentation	CA
16. Overall training plan	CA
17. Specific training agendas	Subcontractors
18. Final commissioning report	CA
19. Misc. approvals	CA

END OF SECTION

1 **GENERAL**

1.1 **Related Requirements**

- .1 Section 03 10 00 – Concrete Forming and Accessories
- .2 Section 03 20 00 – Concrete Reinforcing
- .3 Section 03 35 00 – Concrete Floor Finishing
- .4 Section 03 41 13 – Precast Concrete Hollow Core Planks
- .5 Section 03 45 00 – Precast Architectural Concrete
- .6 Section 32 13 13 – Concrete Paving
- .7 Section 32 16 00 – Curbs, Gutters, Sidewalks and Driveways

1.2 **References**

- .1 All referenced standards shall be the current edition or the edition referenced by the Ontario Building Code in force at the time of building permit application.
- .2 American Society for Testing and Materials (ASTM International):
 - .1 ASTM C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .5 ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .6 ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .7 ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .8 ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .3 Canadian General Standards Board (CGSB):

- .1 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .4 Canadian Standards Association (CSA International):
 - .1 CSA A23.1 / A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 **Administrative Requirements**

- .1 Pre-installation Meetings: convene pre-installation meeting one week prior to beginning concrete works to verify project requirements. Ensure key personnel, site supervisor, speciality contractors (finishing, forming... etc.), concrete producer and testing laboratories attend.
- .2 Concrete Delivery Tickets: keep all concrete delivery tickets on site until building is complete. Record on each ticket when and where concrete was placed.
- .3 Batch Logs: keep record of each batch delivered to the site.
- .4 Record Drawings: Record on a set of Structural Drawings the extent of each pour including the pour date and falsework removal date. Record all field changes including footing elevations.

1.4 **Quality Assurance**

- .1 In accordance with Section 01 45 00 - Quality Control.
- .2 Provide the Consultant, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Concrete supplier to have a valid "Certificate of Ready Mixed Concrete Production Facilities" issued by the relevant Ready Mixed Concrete Association.
 - .2 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

1.5 **Quality Control**

- .1 Submit in accordance with Section 01 45 00 - Quality Control.
- .2 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

- .3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by the Consultant on the following items:
 - .1 Hot weather concrete.
 - .2 Cold weather concrete.
 - .3 Curing.
 - .4 Finishes.
- .4 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, and air temperature and test samples taken.

1.6 **Action and Informational Submittals**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Minimum four weeks prior to starting concrete work, provide valid certificate from plant delivering concrete and quality control plan.
- .3 Minimum 2 weeks prior to starting concrete work, submit all concrete mix designs, and indicate where each concrete mix is to be used.
- .4 Minimum 2 weeks prior to placing concrete, submit drawings showing locations of all construction joints and slab on grade control joints.
- .5 Minimum submission requirements for each concrete mix design shall include the following:
 - .1 Minimum specified compressive strength at 28 day.
 - .2 Maximum aggregate size.
 - .3 Aggregate type (if not normal density).
 - .4 Concrete density range, wet and dry (if not normal density).
 - .5 CSA exposure class.
 - .6 Cement type (if not type GU).
 - .7 Percentage and type of supplemental cementing materials.
 - .8 Maximum water/cementitious ratio.
 - .9 Assumed method of placement of concrete.
 - .10 Corrosion inhibitor (name and quantity, if applicable).
 - .11 Plastic or steel fibres (type, name and quantity, if applicable).
 - .12 Alkali-aggregate resistance.
 - .13 Architectural requirements (colour of cement and aggregate, if applicable).
 - .14 Maximum time from batching to placing concrete (if retarding admixtures are used).

- .6 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in Execution.
- .7 Concrete hauling time: provide for review by the Consultant deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .8 On completion of the concrete works, provide written report to the Consultant verifying compliance that concrete in place meets performance requirements of concrete as established in Products.

1.7 **Delivery, Storage and Handling**

- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
 - .1 Do not modify maximum time limit without receipt of prior written agreement from the Consultant and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by the Consultant.
 - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

2 **PRODUCTS**

2.1 **Design Criteria**

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in Materials.

2.2 **Performance Criteria**

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by the Consultant and provide verification of compliance as described in Quality Assurance.

2.3 **Materials**

- .1 Portland Cement: to CSA A3001.
- .2 Supplementary cementing materials (SCM):
 - .1 Cementitious hydraulic slag: to CSA A3000
 - .2 Fly Ash: to CSA A3001, Type CI.
 - .3 Minimum two weeks prior to placing concrete, Concrete Supplier to provide written recommendation to reduce SCM content to accommodate anticipated environmental conditions.

- .3 Water: to CSA A23.1.
- .4 Aggregates: to CSA A23.1/A23.2. Do not use recycled concrete as aggregate.
- .5 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494.
 - .3 Chemical admixture: to ASTM C1017.
 - .4 Corrosion-inhibiting admixture: calcium nitrate solution.
 - .5 Not to contain chlorides.
- .6 Shrinkage compensating (non-shrink) grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 40 MPa at 28 days.
- .7 Non premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand
 - .1 Compressive strength: 50 MPa at 28 days.
- .8 Curing compound: to CSA A23.1/A23.2 and ASTM C309 to be coordinated and compatible with surface floor hardeners where used.
- .9 Floor surface hardener: Non-metallic, natural grey colour (unless other colour is requested by the Architect), premixed, Mohs Hardness 7 or better.
- .10 Mechanical waterstops: ribbed extruded PVC with shop welded corners and intersecting pieces with legs not less than 250 mm (10") long:
 - .1 At construction Joints:
 - .1 Minimum thickness: 3 mm (1/8").
 - .2 Minimum width: 100 mm (4").
 - .2 Tensile strength: to ASTM D412, method A, Die "C", minimum 13 MPa.
 - .3 Elongation: to ASTM D412, method A, Die "C", minimum 275%.
 - .4 Tear resistance: to ASTM D624, method A, Die "B", minimum 50 kN/m.
 - .5 Low temperature brittleness: to ASTM D746, minimum -37°C.
 - .6 Width in construction joints: 100mm (4").
 - .7 Width in expansion joints: 225mm (9"), with 31mm (1-1/4") O.D. centre bulb.
- .11 Hydrophilic Waterstops: Bentonite, rectangular, flexible, swellable.
- .12 Premoulded joint fillers:

- .1 Bituminous impregnated fiber board: to ASTM D1751.
- .13 Weep hole tubes: plastic.
- .14 Dovetail anchor slots: minimum 0.6 mm (24 gauge) thick galvanized steel with insulation filled slots.
- .15 Bonding adhesive: Portland Cement grout
- .16 Bonding adhesive: Synthetic latex.
- .17 Topping: 50mm bonded concrete topping over precast hollowcore planks.
- .18 Non slip nosing insert for concrete stairs: Fine aluminum oxide strips, 6mm (¼") wide x 10mm (3/8") deep.
- .19 Rigid insulation: Extruded polystyrene boards per ASTM C578, structural grade, compressive strength 100 psi (690 kPa).
- .20 Control joint filler: semi-rigid filler to protect against slab edge breakdown:
 - .1 For sawcuts made with "Soff-Cut" saw: two component epoxy.
 - .2 For conventional sawcuts in interior slab: two component epoxy urethane.
 - .3 For conventional sawcuts in exterior slabs: two or multi component polyurethane based elastomeric.
- .21 Crack Filler: low viscosity epoxy resin.

2.4

Mixes

- .1 Use ready-mix concrete. Proportion concrete in accordance with Alternative 1 - Performance Method for specifying concrete to meet the Consultants performance criteria and to CSA A23.1/A23.2, whichever is more stringent.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
 - .2 Provide concrete mix to meet following plastic state requirements:
 - .1 Workability: free of surface blemishes, loss of mortar, colour variations (in exposed elements) and segregation.
 - .2 As required by the trades placing and finishing the concrete.
 - .3 Provide concrete mixes to meet following hard state requirements:
 - .1 Durability and class of exposure: as indicated on the structural drawings.
 - .2 Compressive strength at 28 days (minimum): as indicated on the structural drawings.
 - .3 Intended application: as indicated on the structural drawings.
 - .4 Aggregate size 20 mm (¾") maximum unless otherwise noted on the structural drawings.

.4 Supplementary cementing materials (SCM):

- .1 Confirm to CSA A23.1.
- .2 Minimum 20% replacement, by mass of total cementitious materials to CSA A3001 for concrete that is not architecturally exposed. Maximize SCM content in foundations, walls and columns where rapid strength gain is not critical to the project schedule.
- .3 Follow slag and fly ash manufacturers' directions for proportioning and mixing of concrete.
- .4 Fly ash not to exceed more than 15% of total cementitious material.
- .5 Maximize SCM content in foundations, walls, columns and any other elements that do not require horizontal finished surface or rapid strength gain to permit early formwork stripping.
- .6 Limit SCM content for floors with special finishes (such as Retroplate), to be compatible with the finish.

3

EXECUTION

3.1

Preparation

- .1 Obtain written approval of each foundation bearing surface by the Geotechnical Consultant prior to placing concrete. Remove water and disturbed soil from excavations before placing concrete.
- .2 Provide 24 hours minimum notice prior to placing of concrete.
- .3 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .4 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .5 Pumping of concrete is permitted only after approval of equipment and review of the proposed mix by the Concrete Supplier.
- .6 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

- .1 Place steel dowels of deformed steel reinforcing bars grouted with Hilti HIT HY-200 (or approved alternate) with standard embedment unless noted otherwise on the structural drawings.
- .11 Before placing slab-on-grade, confirm that subgrade and backfill meet specifications and are free of frost and surface water.
- .12 Provide vapour barrier under slabs placed on the ground including slabs-on-grade and framed slabs as described by the Architectural specifications.

3.2 **Installation/Applications**

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Refer to Notes on Structural Drawings for maximum size and minimum spacing of embedded conduits.
- .3 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by the Consultant.
 - .2 Where approved by the Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - .3 Sleeves and openings greater than 100 x 100 mm (4" x 4") not indicated must be reviewed by the Consultant.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from the Consultant before placing of concrete.
 - .5 Confirm locations and sizes of sleeves and openings shown on drawings.
 - .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .4 Joints
 - .1 Refer to typical details and drawings notes for detailing and maximum spacing requirements.
 - .2 Construction joints:
 - .1 Formed slab: Locate joints near slab / beam / girder midspans unless a beam intersects a girder at this point. In that case offset the girder joint twice the beam width and provide additional shear reinforcement to the acceptance of the Consultant.
 - .2 Slabs on steel deck not supported by composite steel beams: Locate joints in slabs at centre of supports unless there are composite beams.
 - .3 Slabs on steel deck on composite steel beams: Locate joints parallel to purlins at middle of span of slabs and so that joints cross over girders near

- their supports. Locate construction joints parallel to girders at 1200mm (4'-0") from centre line of girders and so that these girders are not included in the earlier pour.
- .4 Walls: locate joints with PVC waterstops at least 300mm (12") away from wall corners and wall intersections.
- .3 Provide evenly spaced vertical control joints in walls.
- .4 Provide expansion joints where shown on Structural Drawings. Remove all forming and filler material used during construction and provide clear space between structural elements equal to width specified.
- .5 Provide construction gaps where shown on Structural Drawings.
- .5 Anchor rods:
 - .1 Set anchor rods to templates in co-ordination with appropriate trade prior to placing concrete.
 - .2 Locate each anchor rod group to within 6mm (1/4") of required location.
 - .3 Grout anchor rods in holes drilled after concrete has set only after receipt of written approval from the Consultant.
 - .1 Drilled holes: to adhesive manufacturers' recommendations.
 - .4 Protect anchor rod holes from water accumulations, snow and ice build-ups.
- .6 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .7 Dovetail anchor slots: in accordance with Section 04 05 00 - Common Work Results for Masonry.
 - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
 - .2 Install continuous vertical anchor slots at 800 mm (2'-6") on centre where concrete walls are masonry faced.
- .8 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .9 Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Mechanical Waterstops

- .1 Provide mechanical (PVC) waterstops for expansion, and control joints in exterior walls, basement walls, retaining walls, slabs supporting earth, and at other locations shown on the Drawings.
- .2 Do not displace reinforcement when installing waterstops.
- .3 Use equipment to manufacturer's requirements to field splice waterstops.
- .4 Tie waterstops rigidly in place.
- .5 Use only straight heat sealed butt joints in field.
- .6 Use factory welded corners and intersections unless otherwise approved by the Consultant.
- .4 Bentonite Waterstops:
 - .1 Provide bentonite waterstops for all construction and temporary joints in exterior walls, basement walls, retaining walls, slabs supporting earth, and at other locations shown. Use PVC waterstops for expansion joints.
 - .2 Locate bentonite waterstops 75 mm (3") from outside face of concrete to avoid spalling of concrete due to swelling pressure of bentonite.
 - .3 Butt strips together. Do not overlap.
 - .4 Fasten to concrete at 600mm (2'-0") maximum.
- .10 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by the Consultant.
 - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction and expansion joints as indicated.
 - .4 Install joint filler.
 - .5 Use 12 mm (1/2") thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to finished slab surface unless indicated otherwise.

3.3 **Placing Concrete**

- .1 Place concrete in accordance with CSA A23.1.
- .2 Delivery and place concrete with minimum re-handling.
- .3 Do not overload forms.
- .4 Use rubber tipped vibrators for concrete containing epoxy coated reinforcement
- .5 Cast slabs with a top surface that is level or sloping as required by the Drawings. Allow for cambering where required. Set top of slab below finished floor level by the distance required for the type of applied finish.
- .6 Where cambered steel beams are used, ensure that slab thickness is as specified. Measure from top of steel to control thickness.

.7 Construction Gaps:

- .1 Do not fill beam and slab construction gaps until all concrete at that level is at least 28 days old.
- .2 Do not fill wall construction gaps until all adjoining framed slabs, above and below, are at least 28 days old.

3.4

Finishing

- .1 Finish concrete to CSA A23.1/A23.2.
 - .1 Architectural concrete: refer to the architectural specifications and drawings.
 - .2 Use procedures as noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
 - .4 Finish concrete floor to CSA A23.1/A23.2. Class A.

.2 Finishing Flatwork:

- .1 See Section 03 35 00 - Concrete Floor Finishing.
- .2 Protect concrete during finishing process. Use evaporation reducer during severe drying conditions.
- .3 Provide final finish in accordance with proposed use and as follows:
 - .1 Screeded and bull floated for: mud slabs and footings/pile caps.
 - .2 Screeded and bull floated with scratch finish for: base slabs which receive mortar setting beds or bonded toppings.
 - .3 Powered float finish for: roofs (except future floors) and slabs which receive a membrane.
 - .4 Wood float finish with brooming for: exterior exposed slabs.
 - .5 Powered steel trowel finish for: interior exposed slabs, slabs which receive resilient flooring, carpet, epoxy-based finishes, thin-set tiles, etc. and future floors. Do not trowel air entrained concrete.
 - .6 Steel trowel exposed interior concrete floors at least twice. Provide final spin trowelling when non-slip finish is required.
- .4 Surface hardeners:
 - .1 Provide where hardened concrete is required by Architectural Drawings or Specifications.
 - .2 Use only liquid hardeners on air entrained concrete; do not use dry-shake applied surface hardeners.
 - .3 Incorporate hardener into the surface of the concrete while concrete is still plastic.

- .4 Follow manufacturer's recommendations for dosage and application procedure.
 - .5 Where coloured hardeners are required, colour will be selected from available colours by Consultant.
 - .6 Hold pre-construction meeting with hardener technical representative and finisher to ensure proper application, curing and protection.
- .3 Finishing Formed Surfaces:
- .1 Completely fill holes left by through-bolts with grout.
 - .2 Do not patch surfaces until instructed in writing by Consultant.
 - .3 Concrete exposed to view:
 - .1 Provide smooth-form finish.
 - .2 Rub exposed sharp edges with carborundum to produce 3 mm (1/8") radius edges unless otherwise indicated.
- .4 Concrete exposed to view:
- .1 Exposed surfaces to be dense, even, uniform in colour, texture and distribution of exposed aggregate.
 - .2 Defects such as honeycombing, voids, loss of fines, visible flow lines, cold joints or excessive bug holes may be cause for rejection at the discretion of the Consultant.
- .5 Toppings:
- .1 Topping mixture to meet minimum requirements as follows: Bonded overlay of a thickness noted on the structural drawings.
 - .2 Make allowance for bonded overlay topping thickness when pouring base course.
 - .3 Apply cement/sand grout to base course to CSA A23.1/A23.2.
 - .4 Place bonded topping to CSA A23.1/A23.2 and topping manufacturer's recommendations.
 - .5 Ensure that joints in topping are of same material as those in base course. Also ensure that their locations precisely match those in base course.

3.5 **Surface Tolerance**

- .1 Concrete surface tolerance to CSA A23.1, Straightedge Method.
- .2 Finish concrete floor to CSA A23.1/A23.2. Class A.

3.6 **Concrete Curing and Protection**

- .1 At a minimum cure and protect concrete in accordance with CSA A23.1
- .2 Extend curing and protection period until concrete has reached following strength levels for structural safety:

- .1 Framed slabs and beams: 75% of specified 28 day strength.
- .2 Columns, walls, piers and footings: 50% of specified 28 day strength
- .3 For concrete containing supplementary cementing materials, curing and protection times may need to be extended beyond those outlined by CSA A23.1 to achieve the required structural properties.
- .4 Cure slab surfaces immediately after finishing is completed. Unless otherwise noted, use a curing compound compatible with applied finishes.
- .5 Do not use curing compound on parking garage slabs and where bonded topping is to be applied. Cover slab surfaces with absorptive mat or fabric and keep continuously wet.
- .6 Slabs on grade and structural slabs receiving resilient floor or other moisture sensitive finishes:
 - .1 Apply 24 hours of wet curing. Start curing immediately after finishing slab.
 - .2 Cover slab for at least 72 hours using plastic sheets with joints taped and free edges covered.
 - .3 Protect finished and cured slab from surface water (i.e. rain, snow).
 - .4 Refer to Architectural Specifications for required testing methods prior to placing floor finishes.
- .7 Concrete exposed to view:
 - .1 Protect during construction period from wear, damage, marking, discolouration, staining and becoming coated with concrete leakage.
 - .2 Unless rejected, repair damage and remove marks and stains to the approval of the Consultant.

3.7 **Slabs on Grade**

- .1 Construction joints and sawcut joints:
 - .1 Refer to drawing notes for maximum spacing requirements.
 - .2 Saw cut depth to be equal to one quarter of the concrete thickness.
 - .3 Locate joints on column lines wherever possible and on intermediate lines, which result in approximately square panels, without re-entrant corners.
 - .4 Do not create "L" shaped panels nor "T" shaped joint intersections.
 - .5 Protect edges of sawcuts from breakage.
 - .6 Clean out sawcuts in exposed concrete and fill with control joint filler after concrete is at least 120 days old.
 - .7 Sawcut top 25 mm (1") at construction joints in exposed concrete for a width of 5 mm (3/16") and fill with control joint filler after concrete is at least 120 days old.

- .8 Clean out sawcuts in other concrete and fill with a sand-cement paste one month prior to installing floor coverings.
- .2 Isolation Joints:
 - .1 Unless otherwise shown on structural drawings, provide min. 10mm (3/8") thick premoulded joint filler of the same depth as the thickness of the concrete wherever slabs-on-grade abut foundation walls, columns and piers. Omit if slab is chased or dowelled into structure.
 - .2 Furnish filler for each joint in single piece for depth and width required for joint,
 - .3 When more than one piece of filler is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .3 Cracks in Slabs-on-Grade:
 - .1 Extensive cracking of slabs-on-grade or cracks in excess of 3mm (1/8") in width may be cause for rejection of slab or portion of slab at Consultant's discretion.
 - .2 Protect edges of cracks in slabs-on-grade from breakage.
 - .3 Exposed slab on grade: Unless slab is rejected, repair cracks that are over 0.4 mm (0.016") wide:
 - .1 Fill cracks with a sand-cement grout after concrete is at least 120 days old.
 - .2 Seven days later, cut out top 20 mm (3/4") of crack for a width of 5 mm (3/16") and fill with control joint filler.

3.8 **Field Quality Control**

- .1 Site tests:
 - .1 Frequency and number of tests to be performed in accordance with CSA A23.1/A23.2.
 - .2 Conduct tests as follows and submit reports as described in Action and Informational Submittals.
 - .1 Concrete pours.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at 7 and 28 days.
 - .5 Air and concrete temperature.
 - .6 Fresh density (for low or semi-low density concrete).
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by the Consultant for review to CSA A23.1/A23.2.
 - .1 Ensure testing laboratory is certified to CSA A283.
- .3 Ensure test results are promptly distributed to all associated parties including the Owner, Project Manager\Contractor and Consultant.

- .4 Take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Inspection or testing by the Consultant will not augment or replace Contractor quality control nor relieve Contractor of their contractual responsibility.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide rough carpentry including but not limited to following:

1.2.1.1. miscellaneous interior carpentry.

- 1.2.2. Related Sections: The following description of the Work is included for reference only and shall not be presumed complete:

1.2.2.1. Provision of architectural woodwork: Section 06 40 00, Architectural Woodwork.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:

1.3.1.1. COFI: Council of Forest Industries; www.cofi.org.

1.3.1.2. FSC: Forest Stewardship Council; www.fsccanada.org.

1.3.1.3. MSDS: Material Safety Data Sheets.

1.3.1.4. NLGA: National Lumber Grades Authority; www.nlga.org.

1.3.1.5. SCAQMD: South Coast Air Quality Management District; www.agmd.gov.

1.3.1.6. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.

1.3.1.7. UL: Underwriters Laboratories Inc.; www.ul.com.

1.3.1.8. VOC: Volatile Organic Compound.

- 1.3.2. Definitions:

1.3.2.1. Dimension Lumber: Lumber of 50 mm (2") nominal or greater, but less than 125 mm (5") nominal in least dimension.

1.3.2.2. Timber: Lumber of 125 mm (5") nominal or greater in least dimension.

- 1.3.3. Reference Standards:

1.3.3.1. CSA O80 Series-08 Wood Preservation

1.3.3.2. CSA O121-08 Douglas Fir Plywood

1.3.3.3. CAN/ULC-S102-07 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.4. QUALITY ASSURANCE

1.4.1. Certifications:

1.4.1.1. Grading:

- 1.4.1.1.1. Provide lumber bearing the grading stamps of an agency certified by the Canadian Lumber Standards Administration Board for identification.
- 1.4.1.1.2. Provide roof sheathing bearing the COFI grading stamp for identification.
- 1.4.1.1.3. Provide "treated" and "fire treated" wood and plywood bearing the stamp of the Canadian Wood Preservers Bureau.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Storage and Handling Requirements:

- 1.5.1.1. Store lumber in a dry place and protect from dampness and damage.
- 1.5.1.2. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Description:

- 2.1.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.
- 2.1.2. Softwood Lumber: Of grades conforming to NLGA's "Standard Grading Rules for Canadian Lumber", graded as follows:
 - 2.1.2.1. Light Framing: Species Group D, Standard Grade.
 - 2.1.2.2. Studding: Species Group D, Stud Grade.
 - 2.1.2.3. Structural Light Framing: Species Group D, No. 1 Grade.
 - 2.1.2.4. Appearance Lumber: Species Group B, Appearance Grade.
- 2.1.3. Hardwood Lumber: Of grades conforming to grading rules of U.S. National Hardwood Lumber Association, solid Yellow Birch, select or better.
- 2.1.4. Concealed Framing Lumber: No. 2 White Pine, No. 2 Red Pine, or No. 1 Construction Eastern Spruce, Balsam Fir or Jack Pine, kiln dried, free from sap, shakes, splits, knots and other defects.
- 2.1.5. Grounds, Nailing Strips and Blocking: No. 2 White Pine, No. 2 Red Pine, or No. 1 Construction Eastern Spruce, kiln dried, free from sap, shakes, splits, knots and other defects.
- 2.1.6. Glue: Waterproof.

- 2.1.7. Rough Hardware: Supply rough hardware to frame and fix rough carpentry. This includes bolts, anchors nails, expansion shields and other fastenings required. Hot dip galvanize hardware for exterior work; elsewhere, provide cadmium plated hardware. Provide spiral thread nails except as indicated otherwise.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify the actual Site dimensions and location of adjacent materials prior to commencing the Work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Properly frame together parts of the Work with members accurately cut to size, closely fitted, well spiked and erected in a substantial manner, plumb, level, square and true to dimension.
- 3.2.2. Locate joints over bearing or supporting surfaces.
- 3.2.3. Provide running members full length wherever possible.
- 3.2.4. Design for expansion and contraction of the materials.
- 3.2.5. After cutting, drilling and fitting "treated" wood and plywood, but before installation, apply 1 full coat of wood preservative to exposed surfaces, including ends of blocking, furring, nailers and rough carpentry.
- 3.2.6. Provide fasteners and rough hardware for a rigid and secure installation.
- 3.2.7. Mix intumescent paint coating product to manufacturer's recommendations. Do not thin or strain. Apply primer and paint coating providing fire resistant barrier in accordance with manufacturer's recommendations to achieve requirements of Authorities Having Jurisdiction. Apply at rate 3.2 m²/l (125 sq ft/gal) to obtain dry film thickness of 0.25 mm (10 mils).
- 3.2.8. Miscellaneous Interior Carpentry: Provide plywood, blocking, furring, nailers, rough carpentry, grounds and nailing strips as indicated and/or as required for proper installation.

3.3. SITE QUALITY CONTROL

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

3.4. PROTECTION

- 3.4.1. Protect rough carpentry from weather.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide architectural woodwork including but not limited to the following:

- 1.2.1.1. wood casework.
- 1.2.1.2. Corian surface counters or equivalent.
- 1.2.1.3. pulls.
- 1.2.1.4. standard hinges and glides.
- 1.2.1.5. laminated casework.
- 1.2.1.6. casework drawers and doors.
- 1.2.1.7. edge banding for casework and casework doors.
- 1.2.1.8. countertops.
- 1.2.1.9. casework hardware.
- 1.2.1.10. interior frames.
- 1.2.1.11. exterior frames.
- 1.2.1.12. preservative treatment.
- 1.2.1.13. paneling.

- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:

- 1.2.2.1. Supply of hollow metal doors and frames: Section 08 11 13 - Steel Doors and Frames.
- 1.2.2.2. Supply of wood doors: Section 08 14 00 - Wood Doors.
- 1.2.2.3. Glass and glazing: Section 08 80 00 - Glass and Glazing.
- 1.2.2.4. Building in and anchoring of steel frames in gypsum board partitions: Section 09 21 16 - Gypsum Board.
- 1.2.2.5. Filling nail holes and provision of finish painting: Section 09 91 00 - Painting.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:

- 1.3.1.1. AWI/AWMAC/WI: American Woodwork Institute/Architectural Woodwork Manufacturers Association of Canada/Woodwork Institute; www.awmac.com.
- 1.3.1.2. AWS: Architectural Woodwork Standards, Edition 1, 2009.
- 1.3.1.3. FSC: Forest Stewardship Council; www.fsccanada.org.

- 1.3.1.4. MDF: Medium Density Fiberboard.
- 1.3.1.5. MSDS: Material Safety Data Sheets.
- 1.3.1.6. NEMA: National Electrical Manufacturers Association; www.nema.org.
- 1.3.1.7. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
- 1.3.1.8. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
- 1.3.1.9. VOC: Volatile Organic Compound.
- 1.3.2. Reference Standards:
 - 1.3.2.1. ANSI A208.1-99 Particleboard
 - 1.3.2.2. ANSI/NPA A208.2-09 Medium Density Fiberboard (MDF) For Interior Applications
 - 1.3.2.3. ANSI/NEMA LD 3-05 High-Pressure Decorative Laminates
 - 1.3.2.4. ASTM E84-08a Test Method for Surface Burning Characteristics of Building Materials
 - 1.3.2.5. CSA O112 Series-M77(06) CSA Standards for Wood Adhesives
 - 1.3.2.6. CSA O153-M80(05) Poplar Plywood
- 1.4. SUBMITTALS**
 - 1.4.1. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00 and Section 1 of AWS. Clearly indicate material being supplied and show connections, attachments, reinforcing, anchorage and location of exposed fastenings.
 - 1.4.2. Samples: Submit samples in accordance with Section 01 30 00 in following sizes:
 - 1.4.2.1. minimum 300 mm (12") long x 400 mm (16") wide x 25 mm (1") thick solid wood.
 - 1.4.2.2. minimum 300 mm (12") square and of specified thickness, veneer mounted on 19 mm (3/4") particle board and finished as specified.
 - 1.4.2.3. each type of hardware.
 - 1.4.2.4. each plastic laminate in manufacturer's standard chip size.
 - 1.4.2.5. minimum 300 mm (12") square x 25 mm (1") thick counter top materials.
- 1.5. QUALITY ASSURANCE**
 - 1.5.1. Qualifications:
 - 1.5.1.1. Provide work of this Section in accordance with Sections 10 and 11 of AWS produced by AWI/AWMAC/WI, except as specified otherwise herein and by reference are hereby made a part of this Section. Ensure any reference to grades and terminology in this Section is as defined in AWS.
 - 1.5.1.2. Requirements of this Section govern and modify AWS.
 - 1.5.1.3. Installers: Provide the work of this Section executed by competent installers with a minimum of 5 years' experience in the application of Products, systems and assemblies specified.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Delivery and Acceptance Requirements:

- 1.6.1.1. Do not deliver finished Products during rainy or damp weather.
- 1.6.1.2. Do not deliver the work of this Section until building and storage areas are sufficiently dry so Products will not be damaged by excessive changes in moisture content.
- 1.6.1.3. Deliver Products of this Section in accordance with Section 2, Rule 4.1.1 of AWS.
- 1.6.1.4. Do not deliver damaged Products.

1.6.2. Storage and Handling Requirements:

- 1.6.2.1. Store and handle Products of this Section in accordance with Section 2, Rule 4.1.2 of AWS.
- 1.6.2.2. Cover finished plastic laminate surfaces and varnished surfaces with heavy kraft paper and put in cartons for protection. Protect installed plastic laminate surfaces by acceptable means. Do not remove protective covers until immediately prior to final cleaning.

1.7. WARRANTY

- 1.7.1. Manufacturer Warranty: Warrant work of this Section for the duration of the warranty period specified in the Articles of Agreement—. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include but are not limited to, delamination of plastic laminate, opening of seams, warpage and extensive colour fading.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Description:

- 2.1.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.
- 2.1.2. Performance/Design Requirements: Ensure millwork (e.g. countertops, wall cabinets, etc.) are capable of supporting structural loads without deflection in accordance with Casework Integrity in Appendix A of AWS.
- 2.1.3. Framing Lumber: Select Merchantable Western White Spruce, kiln dried, or sound material of any species may be used for concealed members, free from sap, shakes, knots, splits and other defects.
- 2.1.4. Architectural Lumber: Clear, straight, kiln dried, Select White Oak for fitments and miscellaneous applications. Provide kiln dried lumber to 7% moisture content, free from blemishes that would be apparent after finish is applied.
- 2.1.5. Plywood: Architectural Grade 'A' Sound Grade Wood (SO) White Oak veneer for unexposed faces.
- 2.1.6. **Wood Veneer (WV1):** Wood veneer for reception desk to be premium Grade 'A', Medium Walnut straight rift cut #40404 manufactured by Treefrog, supplied by McFadden's Hardwood Vaughan, Ontario 1-888-760-2660

2.1.7. High Pressure, Paper Base, Decorative Laminates (PLAM-1):

2.1.7.1. Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and the Specifications:

2.1.7.1.1. Arborite; www.arborite.com

2.1.7.1.2. Formica Inc.; www.formica.com

2.1.7.1.3. Nevamar Company, LLC; www.nevamar.com

2.1.7.1.4. Wilsonart Canada; www.wilsonart.com

2.1.7.1.5. Industrial Laminates/Norplex, Inc.; www.micarta.com

2.1.7.1.6. Pionite Decorative Laminates; www.pionite.com

2.1.7.1.7. Equivalent

2.1.7.2. Colours and Finishes: Provide full colour range including solid, woodgrain and printed patterns, textured, mirror, suede or matte, glossy, high luster/furniture crystal and ashwood finishes. Colours and Product design will be selected later by the Consultant from any or all of above listed manufacturers.

2.1.8. Plastic Laminate Adhesive:

2.1.8.1. Heat-cured urea-formaldehyde type resin in accordance with requirements of CSA O112 Series-M for Work except as otherwise specified in the Contract Documents.

2.1.8.2. Heat-cured resorcinol resin in accordance with requirements of CSA O112 Series-M for wet areas and counter tops with sinks and lavatories built-in.

2.1.9. Wood Cores:

2.1.9.1. Particleboard Laminating Core: Particleboard core of minimum 720 kg/m³ (45 lbs/cu ft) density conforming to ANSI A208.1, Grade R, sanded both sides.

2.1.9.2. MDF Core: Medium density panels, meeting requirements of ANSI/NPA A208.2, balanced design, manufactured from 100% recycled materials, without the use of formaldehyde resins, meeting HUD 24 Standards for emissions, of minimum density of 770 kg/m³ (48 lb/cu ft) and surface character to match sample in Consultant's possession. Ensure fire retardant Product contains fire-retardant chemicals injected with raw materials during manufacturing and achieve a maximum Flame Spread rating of 25 with a maximum Smoke Developed of 200 when tested to ASTM E84. Do not use MDF panels in moist areas. "Excel+ MDF" by Uniboard Canada Inc.; www.uniboard.com, Canfibre Group Limited, or Equivalent.

2.1.9.3. Plywood Core: Poplar plywood conforming to CSA O153-M, Grades A and B.

2.1.10. Solid Surface Material (SS-1 and SS-2)

2.1.10.1. Homogenous compression moulded material composed of acrylic resins or polyester/acrylic resin blend, fire-retardant filler materials, fibre reinforcement, and colouring agents, conforming to ANSI Z124 and FED WW-P-541E, and meeting the following requirements:

2.1.10.1.1. Manufacturers: Provide Products by the following manufacturer's as specified:

2.1.10.1.1.1. Corian, as distributed by Willis Supply Company, contact Kelly Robinson, 1-888-994-5547, ext. 379.

2.1.10.1.1.2. Wilsonart, contact Sherrie Beckford, 647-222-2384

2.1.10.1.1.3. Avonite Surfaces, as distributed by McFadden's, 1-888-760-2660

2.1.10.1.1.4. Cambria Canada, contact Olga Chudakova

olga.chudakova@cambriacanada.com

2.1.10.1.2. Nominal sheet thickness: 1/2".

2.1.10.1.3. Approximate weight: 2 lbs/sq.ft.

2.1.10.1.4. Colours: Two different colours have been specified for this project, SS-1 and SS-2 respectively.

2.1.10.1.5 General Contractor to allow for colour selections from FULL COLOUR RANGE/ALL PRICE CATEGORIES

2.1.10.2. Adhesives and Colour Matched Silicon Sealants: As recommended by the manufacturer to suit details and conditions.

2.1.11. Finishing:

2.1.11.1. Prime unexposed surfaces including backs of fitments against walls and underside of fitments.

2.1.11.2. Before priming, treat knots and sap streaks with a coat of shellac and then prime with a wood primer.

2.1.11.3. Shop finish natural finished wood surfaces.

2.1.12. Hardware

2.1.12.1. The cabinet work manufacturer shall furnish and install cabinet hardware. Finish of hardware shall be US28 depending on base material. Hardware shall be manufactured as follows.

2.1.12.1.1. Pulls - door and drawer, Richelieu Modern Pull – 2362, BP2362128195

2.1.12.1.2. Hinges:

- Blum model 170BL91-653 with Blum mounting plate BL175.810;
- Hafela Aximat hinges self-closing 270 degree; or
- Equivalent.

- 2.1.12.1.3. Cabinet locks door and drawer - National # C8053-5 or Equivalent. All cupboard doors in a room shall be keyed the same. Each room shall be keyed different. Provide 6 master keys for cupboard locks.
- 2.1.12.1.4. Shelf support - Richelieu - # 5834-180 or Equivalent for 32mm spaced holes in all gables or recessed pilaster strips as required.
- 2.1.12.1.5. Door Bumper - Richelieu # AMP5312-11 or Equivalent.
- 2.1.12.1.6. Elbow Catch - Richelieu # BP3675-2G or Equivalent.
- 2.1.12.1.7. Toe Kick Vent - Richelieu # 010533-30 or Equivalent.
- 2.1.12.1.8. Drawer slides - Blum Metabox 320M or Equivalent integrated runner system using epoxy steel carcasses, adjustable front fixing brackets and 12mm Melamine with 3mm PVC on all exposed edges for bottoms and back panels. Install screws to all pre-drilled holes. Use deepest Metabox possible for space available or Equivalent. See Drawings for other slides called for specific locations.
- 2.1.12.1.9. Rough Hardware - Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components. Use galvanized components if exposed to exterior atmosphere. Galvanize in accordance with the requirements of CSAG164-M1981. Install all hardware to manufacturer specifications.
- 2.1.12.1.10. Finishes: Melamine Composite Panels white or as noted on the Drawings. Edge Banding: simulated white or as noted on the Drawings
- 2.1.12.1.11. Computer Grommets: Richelieu Round Stainless Steel Grommet Product# 20692170
- 2.1.12.1.12. Slide Bolts: Gallery 73 - 3" (75 mm) or Equivalent.
- 2.1.12.1.13. Cupboard Doors/Drawer Locks: Schlage, Part # CL100BP, or Equivalent.
- 2.1.12.1.14. Concealed Flush Stain Steel Door Handle: Richelieu Product # 89IN16228170 or Equivalent.
- 2.1.12.1.15. Coat Hooks: cb2 Nicolo knurled black wall hook – supply/install three (3). Consult with architect on exact location/placement for each.

2.2. COMPONENTS

- 2.2.1.1. Exposed Parts Core: Composition board Veneer plywood.
- 2.2.1.2. Exposed Parts Finish: Premium Grade in accordance with Section 10, paragraph 1.2.10 of AWS.
- 2.2.1.3. Semi-Exposed Parts Core: Composition board Veneer plywood.
- 2.2.1.4. Semi-Exposed Parts Finish: Premium Grade in accordance with Section 10, paragraph 1.2.11 of AWS.

- 2.2.2. Casework for Opaque Finish:
 - 2.2.2.1. AWI/AWMAC/WI Quality Grade: Premium.
 - 2.2.2.2. Construction: Ensure casework conforms to Section 10 of AWS.
 - 2.2.2.3. Exposed Parts Core: Composition board Veneer.
 - 2.2.2.4. Exposed Parts Finish: Premium Grade in accordance with Section 10, paragraph 1.2.10 of AWS.
 - 2.2.2.5. Semi-Exposed Parts Core: Composition board Veneer.
 - 2.2.2.6. Semi-Exposed Parts Finish: Premium Grade in accordance with Section 10, paragraph 1.2.11 of AWS.
- 2.2.3. Casework for Plastic Laminate Finish:
 - 2.2.3.1. AWI/AWMAC/WI Quality Grade: Premium.
 - 2.2.3.2. Construction: Ensure casework conforms to Section 10 of AWS.
 - 2.2.3.3. Exposed Parts Core: Composition board Veneer.
- 2.2.4. Edge Banding: 6mm solid wood edge on all exposed edges and adjustable shelf.
- 2.2.5. Solid Surface Countertops:
 - 2.2.5.1. Ensure front edge type is 6 mm pencil edge. Refer to Drawings.
 - 2.2.5.2. Counter tops where indicated to be 19mm thick premium grade quartz by Cambrian or equivalent.
- 2.2.6. Exterior Frames:
 - 2.2.6.1. AWI/AWMAC/WI Quality Grade: Premium.
- 2.2.7. Factory Finishing:
 - 2.2.7.1. Apply finishes in accordance with Section 5 of AWS.
- 2.2.8. Field Touch-Up: Field touch-up is responsibility of installing Subcontractor or architectural woodwork manufacturer providing it is responsible for factory finishing. Field touch-up includes filling and touch-up of exposed job-made nail and screw holes, refinishing of raw surface resulting from job fitting, repair of job-inflicted scratches and mars and final cleaning up of finished surfaces.

2.2.9. Fabrication:

- 2.2.9.1. Fabricate joints accurately fitted, coped where possible and well glued up. Fabricate joints mitred to perfect fit and alignments carefully matched.
- 2.2.9.2. Fabricate finished woodwork in 1 piece where possible. Fabricate running members in the longest lengths obtainable.
- 2.2.9.3. Fabricate to conceal fastenings.
- 2.2.9.4. Provide plastic laminate work in shop.
- 2.2.9.5. Fabricate exposed gables to match the required exposed finishes.
- 2.2.9.6. Exposed wood construction:
 - 2.2.9.6.1. Fabricate joints carefully matched for grain and colour.
 - 2.2.9.6.2. Fabricate millwork with slow fed machines free from sticker and/or sander markings, with sections and moulding work cut accurately to profiles.
 - 2.2.9.6.3. Sandpaper woodwork, smooth removing burrs, feathers, sleeves, raised grain and sharp arises and leave exposed surfaces perfectly clean and smooth ready for finishing.
 - 2.2.9.6.4. Provide edges noted to be solid, as minimum 6 mm (1/4") thick wood to match exposed veneer, glued to core prior to the application of face veneers.
- 2.2.9.7. Countertops and Backspashes:
 - 2.2.9.7.1. Fabricate and assemble countertops in shop to profiles and lengths required.
 - 2.2.9.7.2. Fabricate cutouts for services penetrations as required.
 - 2.2.9.7.3. Verify governing dimensions before fabricating items which abut wall surfaces.
 - 2.2.9.7.4. Provide cutouts required and round internal corners, chamfer edges and seal exposed core.
 - 2.2.9.7.5. Backsplashes (BPG) , 6mm tempered glass to be measured on Site after millwork installation followed by fabricated/installed. Colour to later spec. This spec section is to be read with Section 08 80 00 'Glass and Glazing' Subsection 2.2.4.3.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify the actual Site dimensions and location of adjacent materials prior to commencing work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Install work of this Section in accordance with appropriate Section of AWS.
- 3.2.2. Provide work of this Section true and straight and securely fastened in place.
- 3.2.3. Mitre exposed corners and butt joints.
- 3.2.4. Provide solid surface countertops plumb and true, neatly scribed to adjoining surfaces.
- 3.2.5. Thoroughly fix and anchor work of this Section into position.
- 3.2.6. Mechanical and Electrical Fittings:
 - 3.2.6.1. Provide openings required to accommodate mechanical and electrical fittings as part of the work of this Section and provide a core sealant to protect counter cores which are exposed to accommodate:
 - 3.2.6.1.1. mechanical services and fittings.
 - 3.2.6.2. Mechanical and electrical fittings and services shall be provided as part of the work of Divisions 21, 22, 23, 26, 27 and 28.
- 3.2.7. Installation of Hardware:
 - 3.2.7.1. Install architectural woodwork hardware in accordance with manufacturer's requirements and templates. Adjust architectural woodwork hardware to provide smooth operation and ensure clearances are maintained. Repair damage to adjacent surfaces resulting from failure to conform with this requirement.
 - 3.2.7.2. Provide lubricants required and use in manner to ensure smooth function of hardware consistent with manufacturer's recommendations.
 - 3.2.7.3. Verify fastening components are tightened securely. Align screws, bolts and similar fastenings such that relationship of screw head indentations, similar surfaces and slots are perpendicular to matching vertical or horizontal position when on same surface. Do not burr or otherwise mar edges of surfaces of hardware components. Repair defects caused by work of this Section in an acceptable manner.
- 3.2.8. Do not install damaged Products.

3.2.10. Solid Surfacing Material:

- 3.2.10.1. Fabricate components in shop to the greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings.
- 3.2.10.2. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids.
- 3.2.10.3. Provide holes and cutouts for plumbing and accessories, as indicated on the Drawings.
- 3.2.10.4. Rout and finish component edges to a smooth, uniform finish.
- 3.2.10.5. All surfaces shall have a uniform finish.

3.3. SITE QUALITY CONTROL

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to Owner.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide general installations including but not limited to following:
- 1.2.1.1. installation of hollow metal doors and frames.
 - 1.2.1.2. spot grouting of door frames in gypsum board partitions.
 - 1.2.1.3. installation of finish hardware.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Provision of architectural woodwork: Section 06 40 00 - Architectural Woodwork.
 - 1.2.2.2. Supply of hollow metal doors and frames: Section 08 11 13 - Steel Doors and Frames.
 - 1.2.2.3. Supply of wood doors: Section 08 14 00 - Wood Doors.
 - 1.2.2.4. Installation of gypsum wall board partition steel frames and wall boards: Section 09 21 16 - Gypsum Board.
 - 1.2.2.5. Mechanical fittings and services: Division 22 - Plumbing.
 - 1.2.2.6. Electrical fittings and services: Division 26 - Electrical.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. DHI: Door and Hardware Institute Canada; www.dhicanada.ca.
 - 1.3.1.2. MSDS: Material Safety Data Sheets.
 - 1.3.1.3. NFPA: National Fire Protection Association; www.nfpa.org.
 - 1.3.1.4. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
 - 1.3.1.5. VOC: Volatile Organic Compound.
- 1.3.2. Reference Standards:
- 1.3.2.1. ANSI/WDMA I.S. 1A-04 Industry Standard for Architectural Flush Wood Doors
 - 1.3.2.2. ASTM C305-06 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
 - 1.3.2.3. ASTM C1107/C1107M-06 Standard Specification for Packaged Dry Hydraulic-Cement Grout (Non-Shrink)

- 1.3.2.4. NFPA 80-07 Standard for Fire Doors and Fire Windows
- 1.3.2.5. CAN/ULC-S702-97 Standard for Thermal Insulation Mineral Fibre, for Buildings

1.4. ADMINISTRATIVE REQUIREMENTS

1.4.1. Preinstallation Meeting:

- 1.4.1.1. Prior to commencement of the Work, arrange for the Site meeting of parties associated with the work of this Section. Presided over by the Contractor, include the Consultant, Subcontractor(s), testing company's representative and the manufacturer's representative.
- 1.4.1.2. Review work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of hardware, hardware to be used, installation of methods and procedures related to electrified door hardware, sequence and quality control, project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of this Section. Also discuss following items:
 - 1.4.1.2.1. electrical roughing in and other preparatory work performed by other trades.
 - 1.4.1.2.2. sequence of operation of each type of electrified door hardware.
 - 1.4.1.2.3. construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 1.4.1.2.4. required testing, inspecting and certifying procedures.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and the Specifications:
 - 2.1.1.1. ChemRex Inc.; www.chemrex.com
 - 2.1.1.2. CPD Construction Products; www.cpd.ca
 - 2.1.1.3. Euclid Canada; www.euclidchemical.com
 - 2.1.1.4. Sika Canada Inc.; www.sikacanada.com
 - 2.1.1.5. W.R. Meadows of Canada; www.wrmeadows.com
 - 2.1.1.6. Equivalent

2.2. MATERIALS

2.2.1. Description:

- 2.2.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.

- 2.2.2. Doors, Frames and Hardware: Refer to the following Sections for Products to be installed as part of the work of this Section:
 - 2.2.2.1. Section 06 40 00 - Architectural Woodwork.
 - 2.2.2.2. Section 08 11 13 - Steel Doors and Frames.
 - 2.2.2.3. Section 08 14 00 - Wood Doors.
- 2.2.3. Spot Grout: Proportion when used at metal door frames; 1 part hardwall plaster to not more than 2-1/2 parts "Perlite", or Equivalent, by weight, with enough water added for "hand pack" consistency and/or use "Gyproc 90" by Georgia-Pacific Canada, Inc., "Durabond 90" by CGC Inc., or Equivalent.
- 2.2.4. Threshold Sealant: As recommended by installer in accordance with Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify actual Site dimensions and location of adjacent materials prior to commencing work. Verify frames comply with indicated requirements for type, size, location, swing characteristics and have been installed with plumb jambs and level heads. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Hollow Metal Frames:
 - 3.2.1.1. Install hollow metal frames in accordance with manufacturer's instructions.
 - 3.2.1.2. Set frames plumb, square, level and at correct elevation, maintaining uniform door width and height.
 - 3.2.1.3. Secure anchorages and connections to adjacent construction.
 - 3.2.1.4. Remove temporary steel shipping jamb spreaders prior to setting 1-piece welded frames. Brace frames rigidly in position while being built in. Use precisely-dimensioned installation spreaders at sill and third-points of door opening height to maintain door opening width during building-in. Follow manufacturer's instructions regarding proper use of floor and jamb anchors. Remove installation spreaders only after mortar has set, where applicable.
 - 3.2.1.5. Allow for deflection to prevent structural loads from being transmitted to frame.
 - 3.2.1.6. Spot Grouting:
 - 3.2.1.6.1. Coordinate spot grouting with the work of Section 09 21 16 - Gypsum Board.
 - 3.2.1.6.2. Provide spot grout to increase rigidity of frame and improve resistance to frame rotation caused by weight of door.
 - 3.2.1.6.3. Comply with manufacturer's recommendations for surface preparation, cleaning, forming, mixing, placement and curing of grout.
 - 3.2.1.6.4. Mix grout in accordance with ASTM C305 requirements.

- 3.2.1.6.5. Spot grout at strike and hinge side jambs at steel door frames set in gypsum board partitions, walls and other similar locations in accordance with manufacturer's recommendations. Immediately insert gypsum panels into jamb and attach to framing. Do not terminate gypsum board against trim.
- 3.2.1.6.6. Do not use pumped slurry method to perform spot grouting.

3.2.2. Wood Doors:

- 3.2.2.1. Install wood doors in accordance with manufacturer's instructions and recommendations of ANSI/WDMA I.S. 1A.
- 3.2.2.2. Condition doors to average temperature and humidity in area of installation for not less than 48 hours prior to installation.
- 3.2.2.3. Install doors in a neat and workmanlike manner free from hammer or tool marks, open joints or slivers.
- 3.2.2.4. Set plumb, level, square and true. Install doors after building humidity is at an acceptable level.
- 3.2.2.5. Install in accordance with following edge clearances unless otherwise indicated:
 - 3.2.2.5.1. Between doors and frames: at head and jambs: 3 mm (1/8").
 - 3.2.2.5.2. At door bottom: 9 mm (3/8") maximum unless doors are indicated to be undercut.
 - 3.2.2.5.3. Between meeting edges of pairs of doors: 3 mm (1/8").
- 3.2.2.6. Cut, drill and prepare doors to template to receive hardware.
- 3.2.2.7. Ensure smoke gaskets are in-place before pre-finished door installation.

3.2.3. Finish Hardware:

- 3.2.3.1. Install hardware to doors and frames in accordance with manufacturer's packaged installation, template and adjusting instructions.
- 3.2.3.2. Adjust hardware to provide smooth operation of doors and ensure clearances are maintained. Provide lubricants to allow smooth function of hardware consistent with manufacturer's recommendations.
- 3.2.3.3. Mount hardware at heights in accordance with the "Recommended Locations for Builder's Hardware" by DHI Canada except as otherwise indicated in the Contract Documents or required by the Authorities Having Jurisdiction.
- 3.2.3.4. Install door louvres and frame bumpers.
- 3.2.3.5. Tighten fastening components snugly. Do not burr or otherwise mar the edges of surfaces of hardware components. Repair defects resulting from the work of this Section in accordance with the Consultant's review.
- 3.2.3.6. Set exterior door thresholds in a continuous bed of sealant to prevent water and air intrusion beneath sill.
- 3.2.3.7. Unless otherwise indicated in the Contract Documents, mounting heights for door hardware are as follows:
 - 3.2.3.7.1. Locksets - 1023 mm (40-5/16") from floor to centre line of knob.

- 3.2.3.7.2. Deadlocks - 1524 mm (60") from floor to centre line of cylinder.
- 3.2.3.7.3. Panic Bolts - 1023 mm (40-5/16") from floor to centre line of bar.
- 3.2.3.7.4. Pulls - 1041 mm (41") from floor to centre line of pull.
- 3.2.3.7.5. Push Plates - 1143 mm (45") from floor to centre line of plate.
- 3.2.3.7.6. Guard Bars - 1066 mm (42") from floor to centre line of bar.

- 3.2.3.8. Provide locked room for storage of finish hardware at the job Site and a person responsible for control and distribution of finish hardware.

3.3. SITE QUALITY CONTROL

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

3.4. ADJUSTING

- 3.4.1. Adjust doors and hardware and other moving or operating parts to function smoothly and correctly.

3.5. CLEANING

- 3.5.1. Carefully wipe clean doors of dust created due to the Work of this Contract.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide firestopping and smoke seals including but not limited to the following:

- 1.2.1.1. Firestopping and smoke seals in accordance with Ontario Building Code and Fire Code requirements, at openings and around penetrations, at un-penetrated openings, at projecting and recessed items and at openings and joints within fire separations and assemblies having fire resistance rating, excluding those inside sealed mechanical and electrical assemblies (e.g. inside ducts, dampers, bus ducts etc.).

- 1.2.1.2. Firestopping and smoke seals in accordance with OBC and OFC Code requirements, at openings and spaces at perimeter edge conditions, excluding those inside sealed mechanical and electrical assemblies (e.g. inside ducts, dampers, bus ducts etc.).

- 1.2.1.3. Firestopping and smoke seals edge of slab.

- 1.2.1.4. Ensure seal provides and maintains a fire-resistance rating as determined by OBC for adjacent floor, wall or other fire separation assembly to requirements of and as acceptable to Authorities Having Jurisdiction and to the Consultant.

- 1.2.1.5. Firestopping and smoke seals in and around fire separations, including spaces around mechanical and electrical penetrations, at tops of fire walls, between slab edges and other gaps and penetrations at fire assemblies.

- 1.2.1.6. Ensure the Subcontractors performing work under Divisions 21, 22, 23, 26, 27 and 28 are responsible for firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside electrical bus ducts). Ensure firestopping and smoke seals around outside of such mechanical and electrical assemblies where they penetrate fire-rated separations are part of the work of this Section.

- 1.2.1.7. Systems and specified Products are only a guide and may not address all firestopping conditions pertaining to situations which may be present in the Work. Provide firestopping and smoke seal required for the Work. These Products and systems are not presented to restrict other tested and approved listed assemblies of other manufacturers designing assemblies conforming to OBC and OFC Codes and resolving firestopping required for the Work.

- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:

- 1.2.2.1. Sealants and caulking: Section 07 92 00 - Joint Sealants.

- 1.2.2.2. Gypsum board partitions: Section 09 21 16 - Gypsum Board.

- 1.2.2.3. Firestopping and smoke seals inside mechanical assemblies: Division 21, Fire Suppression, Division 22, Plumbing and Division 23, Heating Ventilating and Air Conditioning.

- 1.2.2.4. Firestopping and smoke seals inside electrical assemblies: Division 26, Electrical, Division 27, Communications and Division 28, Electronic Safety and Security.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:

- 1.3.1.1. MSDS: Material Safety Data Sheets.
- 1.3.1.2. OBC: Ontario Building Code.
- 1.3.1.3. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
- 1.3.1.4. UL: Underwriters Laboratories Inc.; www.ul.com.
- 1.3.1.5. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
- 1.3.1.6. VOC: Volatile Organic Compound.
- 1.3.2. Definitions:
 - 1.3.2.1. Firestop System Types:
 - 1.3.2.1.1. Head of Wall Joint Firestop Systems (HW): Systems intended for installation in vertical separations between wall and floor or roof structures. Ensure these systems do not incorporate penetrating items such as pipes or cables.
 - 1.3.2.1.2. Joint Firestop Systems (JF): Systems intended for installation in openings such as construction joints, gaps and spaces in floors or walls or at floor and wall intersections in accordance with approved systems. Ensure these systems do not incorporate penetrating items such as pipes or cables.
 - 1.3.2.1.3. Perimeter Joint Firestop Systems (PJ): Perimeter joint firestop system ratings are governed by lowest of fire resistance ratings of individual components (i.e. the wall, floor or joint system). These systems consist of floor with fire endurance rating, exterior wall with or without fire endurance rating and perimeter joint system. Ensure these perimeter joint firestop systems do not incorporate penetrating items such as pipes or cables.
 - 1.3.2.1.4. Service Penetration Firestop Systems (SP): Systems intended for installation in openings of limited dimensions and shape in floor or wall assemblies in accordance with approved systems. Ensure penetrating pipes, cable trays and similar items are in exact accordance with approved systems.
 - 1.3.2.1.5. Service Penetration for Combustible Systems (SPC): Systems intended shall be installation in openings of limited dimensions and shape in floor or wall assemblies in accordance with approved systems. Ensure penetrating pipes are in exact accordance with approved systems. These systems shall be tested with a minimum differential pressure of 50 Pa between exposed and unexposed surfaces of assembly to meet OBC and OFC Code requirements for Combustible Pipes for Use in Drain, Waste and Vent Piping.
 - 1.3.2.2. Ratings: Rating of firestop system applies to its use in specific assembly of materials, penetration and floor or walls in which it is tested as follows:
 - 1.3.2.2.1. F Rating: When system remains in opening during fire test for rating period without permitting passage of flame through openings or occurrence of flaming on any element of unexposed side of assembly.

- 1.3.2.2.2. FT Rating: When system remains in opening during fire test in accordance with F Rating requirement and additionally, transmission of heat through firestop system during rating period shall not have been such as to raise temperature of any thermocouple on unexposed surface of system more than 163 deg C (325 deg F) above initial temperature.
- 1.3.2.2.3. FH Rating: When system remains in opening during fire and hose test in accordance with F Rating requirement and additionally, during hose stream test firestop system shall not develop any opening that would permit a projection of water from stream beyond unexposed side.
- 1.3.2.2.4. FTH Rating: When system remains in opening during fire test and hose stream test within limitations described for F, FT and FH ratings.
- 1.3.2.2.5. L Rating: Based on volume of air flowing, per unit of time through opening around test sample under specified pressure difference applied across surface of system. L Ratings are intended to determine acceptability of firestop systems with reference to control of air movement through assembly. Rating is expressed in litres per second (l/s) per linear metre of opening for joint systems.

1.3.3. Reference Standards:

- 1.3.3.1. NFPA 101-09 Life Safety Code
- 1.3.3.2. CAN/ULC-S101-07 Standard Methods of Fire Endurance Tests of Building Construction and Materials
- 1.3.3.3. CAN/ULC-S102-07 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- 1.3.3.4. ULC-S115-05 Standard Method of Fire Tests of Firestop Systems
- 1.3.3.5. ULC Guide No. 40 U19 Firestop Systems
- 1.3.3.6. ULC Guide No. 40 U19.13 Firestop Systems Components

1.4. ADMINISTRATIVE REQUIREMENTS

- 1.4.1. Preinstallation Meetings: Prior to commencement of sealing, arrange for Product manufacturer's knowledgeable representative to meet and discuss installation procedures and unique conditions at the Place of the Work, inspect substrate surfaces and recommend solutions to accommodate adverse conditions, periodically visit and verify installations before being concealed and report unsatisfactory conditions to the Contractor, attend final inspection and to submit written certification that Products, systems and assemblies have been installed in accordance with manufacturer's requirements.

- 1.4.2. Scheduling: Coordinate with Subcontractors involved and advise dates where work will take place throughout various areas of work.

1.5. SUBMITTALS

- 1.5.1. Product Data: Submit manufacturers' specifications and technical data for each material including compositions, limitations, documentation conforming ULC firestop system proposed for this Contract and the manufacturers' installation instructions.

- 1.5.2. Shop Drawings:

- 1.5.2.1. Submit Shop Drawings in accordance with Section 01 30 00 – Administrative Requirements. Submit complete and detailed Shop Drawings for each condition encountered on Site. Indicate following:

- 1.5.2.1.1. ULC and/or cUL assembly number certification and material safety data sheets.
- 1.5.2.1.2. required temperature rise and flame rating.
- 1.5.2.1.3. hose stream rating (where applicable).
- 1.5.2.1.4. thickness.
- 1.5.2.1.5. proposed installation methods.
- 1.5.2.1.6. material of firestopping and smoke seals, primers, reinforcements, support and securement methods, damming materials, reinforcements and anchorages /fastenings.
- 1.5.2.1.7. size of opening.
- 1.5.2.1.8. adjacent materials.
- 1.5.2.1.9. number of penetrations.
- 1.5.2.2. Designate on Shop Drawings fixed penetrants, relative positions, number of penetrations, expansion and control joints in rated slabs and walls, firestopping details at receptacles and similar poke-through devices and surrounding permanent materials. Identify re-entry locations.
- 1.5.2.3. Submit fireproofing manufacturer's written verification that manufacturers have identified where firestopping is required, have selected correct firestop system and applicators have been trained by system manufacturers. Products, systems and assemblies have been installed in accordance with manufacturer's requirements.
- 1.5.3. Samples: Submit only as requested and in accordance with Section 01 30 00 – Administrative Requirements, various types of firestopping and smoke seal material.
- 1.5.4. Certificates:
 - 1.5.4.1. Submit manufacturer's verification that installed firestopping and smoke seal materials comply with specified requirements.
 - 1.5.4.2. Submit copies of ULC and/or Warnock Hersey Listing cards for review.
- 1.6. CLOSEOUT SUBMITTALS
 - 1.6.1. Operational and Maintenance Data: Provide maintenance data for materials and prefabricated devices, providing descriptions sufficient for identification on Site in accordance with requirements of Section 01 70 00 - Execution and Closeout Requirements.
- 1.7. QUALITY ASSURANCE
 - 1.7.1. Qualifications:
 - 1.7.1.1. Installers: Provide the work of this Section executed by competent installers experienced, trained, licensed and approved, by material or system manufacturer for application of materials and systems being used having a minimum of 5 years' experience in application of Products, systems and assemblies specified. Ensure firestopping systems conform to requirements of ULC-S115 tested assemblies that provide fire rating as shown.
- 1.8. DELIVERY, STORAGE AND HANDLING
 - 1.8.1. Delivery and Acceptance Requirements: Deliver materials to the Site in the manufacturer's sealed and

labelled containers. Materials are subject to Consultant's inspection.

1.8.2. Storage and Handling Requirements:

1.8.2.1. Store materials inside building for 24 hours prior to use; store in area designated by the Consultant. Protect from damage and environmental conditions detrimental to material.

1.8.2.2. Comply with manufacturer's temperature, relative humidity and substrate moisture content for storage, mixing, application and curing of Products.

1.9. SITE CONDITIONS

1.9.1. Ambient Conditions:

1.9.1.1. Comply with the manufacturer's recommended requirements for temperature, relative humidity, moisture content and presence of any sealer or release agents on substrate during application and curing of materials. Ensure surfaces are dry and frost free.

1.9.1.2. Maintain minimum temperature of 5 deg C (40 deg F) for minimum period of 1 week before application, during application and until application is fully cured.

1.9.1.3. Ventilate areas in which firestopping is being applied. Protect water-soluble material from wetting until fully cured.

1.10. WARRANTY

1.10.1. Manufacturer Warranty: Warrant work of this Section against defects and deficiencies for period of 5 years. Promptly correct any defects or deficiencies which become apparent within the warranty period, to satisfaction of the Consultant and at no additional expense to the Owner. Defects include but are not limited to cracking, breakdown of bond, failure to stay in place or bleeding.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and the Specifications:

2.1.1.1. A/D Fire Protection Systems Inc.; www.adfire.com

2.1.1.2. GE Canada, Inc.; www.gesilicones.com

2.1.1.3. Electrical Products Division/3M; www.3m.com

2.1.1.4. Grace Construction Products; www.graceconstruction.com

2.1.1.5. Instant Firestop Inc.

2.1.1.6. Hilti (Canada) Corporation; www.ca.hilti.com

2.1.1.7. Johns Manville, Fire Protection Systems; www.jm.com

2.1.1.8. M.W. McGill and Associates Ltd.

2.1.1.9. Nelson Firestop Products; www.nelsonfirestop.com

2.1.1.10. ThermoFire Systems Inc.

2.1.1.11. Thomas & Betts Ltd.

2.1.1.12. Tremco Canada; www.tremcosealants.com

[2.1.1.13. Equivalent](#)

- 2.1.2. Substitution: Comparable Products from manufacturers listed herein will be accepted provided they meet requirements of this the Specification.
- 2.2. MATERIALS
 - 2.2.1. Description:
 - 2.2.1.1. Regulatory Requirements: Where required, provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 - Quality Requirements for further requirements.
 - 2.2.2. Performance/Design Criteria: Ensure firestop systems intended for installation in fire separations have assigned fire ratings as defined herein when tested in accordance with ULC-S115. Ensure firestop systems intended for use in fire resistive wall and/or floor assemblies are evaluated in accordance with CAN/ULC-S101 (Refer to ULC Guide No. 40 U19).
 - 2.2.3. Head of Wall Joint Firestop Systems: (HW): Use only firestop systems that have been ULC tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements and fire rating involved for each separate instance.
 - 2.2.4. Ensure firestopping system provides fire-resistance rating, flame and temperature not less than fire resistance rating of surrounding floor, wall or assembly, in accordance with requirements of OBC.
 - 2.2.5. Firestop System Rating: Where applicable, comply with F rating based on number of hours system can resist flames and gases; T rating based on maximum temperature rise of 163 deg C (325 deg F) above ambient for any thermocouple in addition to flame, gas and stream performance and H rating based on capacity to withstand hose stream after burn. Design combined and/or built-up Site systems in accordance with approved restrictions and technical evaluations acceptable to the Consultant and Authorities Having Jurisdiction.
 - 2.2.6. Ensure systems provide fire and temperature rating in accordance with those outlined in OBC and effectively impede passage of flame, smoke and gasses.
 - 2.2.7. Firestopping seals except for wall joints in visible areas must be of easily identifiable colour, such as red or yellow to be clearly distinguished from other building materials.
 - 2.2.8. Ensure service penetration components and assemblies, including back-up materials and supports are certified in accordance with ULC-S115 or CAN/ULC-S101 and are ULC listed by a certified Authority recognized by building code officials where the project is being constructed.
 - 2.2.9. Ensure suitability of Products for application and compatibility of materials with surfaces to which it will be applied.
 - 2.2.10. Ensure Site system assembly is in accordance with ULC-S115 labeled and listed system design limitations, unless proposed assembly is approved by Authorities Having Jurisdiction and meets Consultant's approval. Design combined and/or built-up Site systems in accordance with approved restrictions and technical evaluations acceptable to Consultant and Authorities Having Jurisdiction. Engineering judgements from firestopping manufacturers reviewed by the Consultant and Authorities Having Jurisdiction may be used for conditions where a ULC firestopping system is not available.
 - 2.2.11. Ensure sealants and putty for overhead and vertical joints are non-sagging; seals for floors, self-levelling. Ensure flexible fire stop sealant provides movement capability in fire rated joint applications. Ensure sealants are compatible with base materials such as, without limitations, masonry, concrete, metal, gypsum board and other similar items.
 - 2.2.12. Ensure Products have a compressive strength capable of providing self-support at a penetrating item and shall maintain their integrity as tested in a ULC vertical application.
 - 2.2.13. Ensure Products are compatible with abutting dissimilar architectural coatings and finishes at floors,

walls, ceilings, waterproofing membranes and the like. Review Drawings and check the manufacturer of selected materials being installed.

- 2.2.14. Integral Pipe Sleeves/Firestopping Components: Other Sections within Divisions 21, 22 and 23 may specify fire-rated pipe sleeves, cast-in pipe/sleeve assemblies and integral firestopped penetration devices and accessories listed by authorized testing and certification Authorities. These systems may eliminate need for separate firestopping applications at certain designated locations and it is the responsibility of the Contractor to determine any and all locations where such devices will be utilized on the Contract.
- 2.2.15. Do not provide Products containing asbestos.
- 2.2.16. Firestopping System 1 (JF Systems):
- 2.2.16.1. This Firestopping System is primarily an expansion, control and perimeter seal without smoke resistance and shall be non-combustible, semi-rigid, felt fire protection. Certified assembly of one of listed manufacturers and acceptable to the Consultant.
- 2.2.16.2. Ensure blanket type firestopping is listed and labelled in accordance with ULC Guide No. 40 U19 or 40 U19.13, with reference to 'JF System Listings'.
- 2.2.16.3. Where required by listing, ensure impaling clips are heavy gauge galvanized wire or 25 mm (1") wide x 0.607 mm (24 ga) galvanized steel, Z formed with horizontal bottom and dimensions conforming to location of firestopping and width of void to be filled. Ensure compression of joint do not damage clips.
- 2.2.17. Firestopping System 2: Same materials as in System 1, but without use of impaling clips and with smoke and fluid seal with hose stream resistance. Certified assembly of one of listed manufacturers and acceptable to the Consultant.
- 2.2.18. Firestopping System 3: Fire, gas, fluid and hose stream resistant elastomeric sealant with movement capabilities, ULC labeled assembly of one of listed manufacturers and acceptable to the Consultant. Ensure materials have elastic characteristics where used at openings subject to movement. Intumescent pads may form part of this system, at the Contractor's option.
- 2.2.19. Firestopping System 4: Ensure firestopping, gas, fluid and hose stream resistant seals at openings intended for ease of re-entry such as cables have an elastomeric seal or proprietary assembly of following types; a cementitious or rigid seal at such locations is not permitted. Certified assembly of one of listed manufacturers and acceptable to the Consultant.
- 2.2.20. Firestopping System 4-A: Where openings are considered large such as at cable trays and bus ducts. Certified assembly of one of listed manufacturers and acceptable to the Consultant.
- 2.2.21. Firestopping System 5 (Cavity Wall Compartment Closer and Firestopping): Strips of "RXL Safe" semi-rigid mineral fibre insulation by Roxul Inc. or Equivalent, 75 mm (3") wide by depth of cavity plus 13 mm (1/2") with galvanized skewers for securement at 300 mm (12") oc, or compressed 25% to fill depth of cavity.
- 2.2.22. Primers: To manufacturer's recommendations for specific material, substrate and end use.
- 2.2.23. Damming and Backup Materials, Supports and Anchoring Devices: Non-combustible, conforming to manufacturer's recommendations in accordance with tested assembly being installed and as acceptable to Authorities Having Jurisdiction. Ensure sheet steel covers over temporarily unused sleeves in tenant and similar spaces are minimum 0.912 mm (20 ga) thick galvanized sheet steel formed to a tight fit over opening with specified firestopping materials installed beneath. Combustible materials are acceptable only if they are approved under ULC or cUL systems, otherwise they should be removed after permanent firestop materials have cured.
- 2.2.24. Pipe and Duct Insulation and Wrappings Compatible with Firestopping Systems: "Nelson WRP" by Nelson Electric Ltd. for use with Nelson Electric Ltd. Firestops, "Instant Type PI" by Instant Firestop Inc.

for use with Instant Firestop Inc. firestops, "TREMstop WS" by Tremco Canada, or Equivalent.

- 2.2.25. Intumescent Pads: "FSP 1077" by Grace Construction Products, "FSP Pads" by Nelson Electric, "Instant Putty 200" by Instant Firestop Inc., "Type PLW Firestop Pillow" by Electrovert Ltd, or Equivalent.
- 2.2.26. Re-Entry Pillows: Permanently pliable, "FSPIL Pillows" by Grace Construction Products, "Type PLW Firestop Pillow" by Electrovert, "PLW" by Nelson Electric, "TREMstop PS" by Tremco Canada or Equivalent.
- 2.2.27. Mixes:
 - 2.2.27.1. Mix materials at correct temperature and in accordance with manufacturer's directions.
 - 2.2.27.2. Cleaning Materials: As recommended by firestop manufacturer.

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions:

- 3.1.1.1. Verify actual Site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.1.2. Verify openings, dimensions and surfaces conform to fire and smoke seal assembly.
- 3.1.1.3. Examine sizes of penetrating service, percentage fill and sleeve or opening sizes with exact annular space calculations, anticipated movement and conditions necessary to establish correct type, thickness and installation of back-up materials and seals.

3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

3.2.1. Surface Preparation:

- 3.2.1.1. Provide primer or surface conditioner if required by Product manufacturer. Prime surfaces in accordance with manufacturer's directions.
- 3.2.1.2. Remove combustible material and loose material detrimental to bond from edges of penetration. Clean, prime or otherwise prepare substrate material to manufacturer's recommendation.
- 3.2.1.3. Remove insulation from insulated pipe and duct where such pipes or ducts penetrate a fire separation unless ULC certified assembly permits such insulation to remain within assembly, or where mechanical trades have installed special fire rated insulated sleeves. Ensure continuity of thermal and vapour barriers where such are removed, altered or replaced, to satisfaction of Division 21, 22 23 requirements and the Consultant.
- 3.2.1.4. Alternatively, ensure pipe and duct insulation and wrappings occurring within openings to receive firestopping and smoke seals under this Section are installed prior to work of this Section and insulation and wrappings within fire seals are ULC listed components of system to be installed under this Section, unless ULC certified assembly permits such other insulation and wrappings to remain within assembly. Coordinate the work of this Section with the work of Divisions 21, 22 and 23.
- 3.2.1.5. Clean bonding surfaces to remove deleterious substances including dust, paint, rust, oil, grease, moisture, frost and other foreign matter which may otherwise impair effective bonding.

3.3. INSTALLATION

- 3.3.1. Do not apply firestop material to surfaces previously painted or treated with sealer or curing compound, unless tests have been performed to ensure compatibility of materials. Remove coatings as required that negate firestop properties. .
- 3.3.2. Provide temporary forming, packing and bracing materials necessary to contain firestopping. Upon completion, remove forming and damming materials not required to remain as part of system.
- 3.3.3. Install damming and firestopping materials as per manufacturer's instructions.
- 3.3.4. Mix and apply firestopping and smoke seals in accordance with manufacturer's instructions and tested designs to provide required fire (temperature and flame) rated seal, to prevent passage of smoke and where specifically designated, passage of fluids.
- 3.3.5. Provide temporary forming and packing as required. Apply materials with sufficient pressure to properly fill and consolidate mass to seal openings.
- 3.3.6. Tool or trowel exposed surfaces. Allow materials to cure by not covering up materials until full curing has taken place.
- 3.3.7. Where a designated system described hereinafter does not meet OBC or OFC Code requirements for particular service condition, substitute with next higher system meeting required rating.
- 3.3.8. Notify the Consultant when completed installations are ready for inspection and prior to concealing or enclosing firestopping and smoke seals.
- 3.3.9. System 1:
 - 3.3.9.1. Install fire rated joint firestopping by compressing material minimum of 25% to ensure complete sealing and to follow irregularities of concrete slabs at perimeter of building where junction occurs with back of cladding system. Apply firestopping sealant of spray over compressed mineral wool.
 - 3.3.9.2. Butt succeeding sections of firestopping material tightly up against preceding. Leave no voids.
 - 3.3.9.3. Provide firestopping between exterior wall cladding and concrete floor slab. Secure and support to suit design requirements.
 - 3.3.9.4. Use this System for joint seals through fire-resistance rated floor slabs, ceilings and roofs unless otherwise stipulated.
- 3.3.10. System 2:
 - 3.3.10.1. At fire-rated masonry walls and gypsum board partitions which extend nominally to within 19 mm (3/4") of underside of deck above, insert fire rated joint assembly firestopping material in 25% compression in accordance with ULC test requirements and manufacturer's instructions. Provide adequate depth of material to fill gap flush with face of wall, except as otherwise specified. Apply firestopping sealant of spray over compressed mineral wool.
 - 3.3.10.2. Insert at intersection of fire-resistance rated masonry and gypsum board partitions.
 - 3.3.10.3. Insert at both sides of control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - 3.3.10.4. Where wall/slab junction is exposed in finished work, keep fibre back 9 mm (3/8") from face of block and apply fire-resistant sealant to gap, tooling to a concave joint.
 - 3.3.10.5. At perimeter slab locations where this system would otherwise be exposed in finished work and where smoke seal is required, provide cover spray material of thickness as

recommended by manufacturer of System 2 material set flush with top of slab and tooled smooth. Minimum cover spray thickness 3 mm (1/8"). Where anticipated movement in joint width is inevitable, select sealant with elastic capabilities.

3.3.11. System 3:

- 3.3.11.1. This System establishes fire rated firestopping for service penetrations throughout the Contract. Seal gaps and holes in fire-rated walls and slabs and composite construction through which conduit, wire, cables, ductwork, piping and other protrusions pass as a result of work using fire-resistant penetration sealant. Include opening which have been formed, sleeved and cored.
- 3.3.11.2. Apply at unpenetrated openings and sleeves installed for future use through fire-resistance rated assemblies.
- 3.3.11.3. Apply this System between spaces having different air pressures. (See Mechanical Drawings for pressurized areas and locations of moving penetrants.)
- 3.3.11.4. Apply at "wet" rooms supported by suspended slabs at locations over electrical and equipment rooms or similar areas containing power devices in which future re-entry is not required.
- 3.3.11.5. Apply at mechanical rooms and similar rooms having systems containing liquids, including piping runs, unless such rooms are located over slab-on-grade.
- 3.3.11.6. Install System 3 materials at elevator shafts, duct shafts and other similar locations over occupied spaces.
- 3.3.11.7. Install 6 mm to 9 mm (1/4" to 3/8") bead of firestop caulking at interface of retaining angles around fire dampers, where angles meet fire-rated assembly and between retaining angles and fire damper, both sides of penetration. At floor locations, sealant bead at top of assembly is adequate.
- 3.3.11.8. Where necessary, remove insulation from insulated pipe and duct where such services penetrate a fire separation unless certified assembly permits such insulation to remain within assembly. Apply wrapping materials as listed herein.
- 3.3.11.9. Install System 3 materials at open wall joints, including expansion joints between fire rated enclosures and assemblies.

3.3.12. Systems 4 and 4A: Install at following locations:

- 3.3.12.1. At electrical, electrical switchgear, electrical transformer rooms and at telephone equipment rooms requiring re-entry for additional services.
- 3.3.12.2. Install at communications and computer cable penetration points throughout.

3.3.13. Accessories: At hollow fire-rated walls, apply intumescent pads to back surfaces and cable entry points of electrical boxes, panels and other service penetration points, ensuring close coordination with electrical, mechanical and drywall trades. Where greater dimension of panel exceeds 500 mm (20"), gypsum board trades shall construct fire-rated enclosure around recessed panels.

3.3.14. System 5: Maintain maximum cavity wall compartments to lesser of following 2 criteria by bridging gap between cavity back-up material and back face of brick with full-depth strips of compartment closer and firestopping material, securing in position with mechanical fasteners and sealing against firm, primary cavity materials:

- 3.3.14.1. 10 m² (100 sq ft).
- 3.3.14.2. Division B, Part 3, Paragraph 3.1.11 of OBC.

- 3.3.15. Penetration Sizing: Ensure following regulates sizing of service penetrations to be firestopped, other than for fire dampered openings:
 - 3.3.15.1. Ensure single, circular penetration is sleeved by work of Divisions 21, 22, 23, 26, 27 and 28.
 - 3.3.15.2. Multiple penetrations of circular elements are defined as more than 1 circular penetration having a maximum space of 100 mm (4") between closest faces of such penetrating elements. Forming of such multiple penetrations is responsibility of respective trades whose service penetrates rated assembly and such formed opening shall be square or rectangular frame around group of penetrations in which maximum clearance between outer penetration element and face of opening shall be 25 mm (1").
 - 3.3.15.3. Create single and multiple rectangular penetrations in same manner as specified above, but edge clearance may be increased to a maximum of 50 mm (2").
 - 3.3.15.4. Exception; at fire dampers, clearances are governed by testing Authorities' requirements.
 - 3.3.15.5. For purposes of this specification, a moving penetrant is defined as a penetrating device having an anticipated movement of greater than 9 mm (3/8") when measured at right angles to face of rated assembly.
- 3.3.16. Cable Tray Penetrations:
 - 3.3.16.1. Seal cable tray penetrations with re-enterable matrices having a minimum compressive strength of 250 psi having a minimum Fire, Temperature and Hose Rating of 1/2 hr for 500 MCM cables and 2 hr for 300 MCM cables.
 - 3.3.16.2. Ensure listings are for cable tray tests carried out having maximum percentage listed by ULC and/or UL of cable density.
- 3.4. SITE QUALITY CONTROL
 - 3.4.1. Site Testing and Inspections:
 - 3.4.1.1. Perform a series of 5 fog tests to random locations as designated by the Consultant. Should any penetration, joint or void, under jurisdiction of this Section, emit visible fog, make repairs and replace deficiencies and re-perform fog test at no additional cost to the Owner.
 - 3.4.1.2. Ensure fog units (machines) have a formulation output range of (1.5 gal/hr). Formulation particle size should be 0.5 - 25 µm. Ensure fogging agent is non-toxic, non-staining and provides a heavy fog at 30 ppm with a permissible airborne level concentration of 50 ppm.
 - 3.4.1.3. Fog at a rate of 4 s/100 cu ft. Maintain fog density until inspection is complete.
 - 3.4.1.4. Independent inspection and testing company may be appointed and paid for by the Owner to carry out additional inspection and testing as directed by the Consultant. Refer to Section 01 40 00 – Quality Requirements. Tests include 3 fog tests per floor at random locations.
 - 3.4.1.5. Where work or materials fail to meet requirements as indicated by test results, the Contractor shall pay costs of additional inspection and testing required for new replacement work or materials.
 - 3.4.2. Ensure firestopping systems do not affect structural integrity of load bearing walls and assemblies. Coordinate with the Consultant prior to penetrating any load bearing assembly. For unusual firestop application for which no tested system is available, ensure manufacturers submit their proposal to local Authorities Having Jurisdiction for their review and approval prior to installation.
 - 3.4.3. Ensure the work of this Section is completed by one Subcontractor responsible for firestopping

materials and systems for all work except as specified herein.

- 3.4.4. Conform to both temperature and flame ratings of standards listed hereinafter and other requirements of Authorities Having Jurisdiction.
- 3.4.5. Manufacturer Services: Consult with the Product manufacturer's technical representative about following items:
 - 3.4.5.1. fire stopping system for fire separation required.
 - 3.4.5.2. curing characteristics of materials specified.
 - 3.4.5.3. joint characteristics as built.
- 3.5. CLEANING
 - 3.5.1. Remove excess materials and debris and clean adjacent surfaces immediately after application to satisfaction of the Consultant. Remove and/or correct staining and discolouring of adjacent surfaces as directed.
 - 3.5.2. Remove temporary dams after initial set of firestopping and smoke seal materials where such materials are left exposed in finished areas and flame spread rating of such materials exceed a value of 25, in accordance with CAN/ULC-S102.
- 3.6. PROTECTION
 - 3.6.1. Fully protect walls, windows, floors and other surfaces around areas to be firestopped from marring or damage. Mask where necessary to avoid spillage onto adjoining surfaces. Mask areas adjacent to openings, where necessary to prevent contamination or marring of adjacent surface materials. Remove masking after seal has been completed and an initial set has been achieved. Remove stains on adjacent surfaces as required.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide joints sealants including but not limited to the following:

1.2.1.1. Interior:

- 1.2.1.1.1. control and expansion joints on exposed interior surfaces of exterior walls.
- 1.2.1.1.2. perimeter joints of exterior openings where indicated.
- 1.2.1.1.3. tile control and expansion joints.
- 1.2.1.1.4. joints between different materials listed above.
- 1.2.1.1.5. perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
- 1.2.1.1.6. joints between plumbing fixtures and adjoining walls, floors and counters.
- 1.2.1.1.7. other joints as indicated.

1.2.1.2. mildew resistant sealants.

1.2.1.3. self leveling sealants.

1.2.1.4. pick proof sealants.

- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:

1.2.2.1. Firestopping and smoke seals: Section 07 84 00 - Firestopping and Smoke Seals.

1.2.2.2. Sealing of joints around sound attenuating gypsum board partitions: Section 09 21 16 - Gypsum Board.

1.2.2.3. Read other Specification Sections for extent of sealing specified in those Sections. Do other sealing indicated, specified or required.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:

1.3.1.1. IPA: Isopropyl Alcohol.

1.3.1.2. MEK: Methyl-ethyl-ketone.

1.3.1.3. MSDS: Material Safety Data Sheets.

1.3.1.4. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.

1.3.1.5. SWRI: Sealant, Waterproofing, & Restoration Institute; www.swrionline.org.

1.3.1.6. VOC: Volatile Organic Compound.

1.3.2. Reference Standards:

1.3.2.1. ASTM C661-06 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealant by Means of a Durometer

1.3.2.2. ASTM C719-93(05) Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

1.3.2.3. ASTM C834-05 Standard Specification for Latex Sealants

1.3.2.4. ASTM C920-08 Standard Specification for Elastomeric Joint Sealants

1.3.2.5. ASTM C1021-08 Standard Practice for Laboratories Engaged in Testing of Building Sealants

1.3.2.6. ASTM C1248-08 Standard Test Method for Staining of Porous Substrate by Joint Sealants

1.4. SUBMITTALS

1.4.1. Product Data: Submit Product information from sealant manufacturer prior to commencement of the work of this Section verifying:

1.4.1.1. selected sealant materials are from those specified.

1.4.1.2. composition and physical characteristics.

1.4.1.3. surface preparation requirements.

1.4.1.4. priming and application procedures.

1.4.1.5. suitability of sealants for purposes intended and joint design.

1.4.1.6. test report on adhesion, compatibility and staining effect on samples of adjacent materials used on Contract.

1.4.1.7. sealants compatibility with other materials and Products with which they come in contact including but not limited to sealants provided under other Sections, insulation adhesives, bitumens, brick, stone, concrete, masonry, metals and metal finishes, ceramic tile, plastic laminates and paints.

1.4.1.8. suitability of sealants for temperature and humidity conditions at time of application.

1.4.2. Test and Evaluation Reports:

1.4.2.1. Compatibility Testing Report: Submit in accordance with Section 01 30 00 – Administrative Requirements. Prior to supply or installation, test exterior sealant materials for compatibility with joint substrates. Test for staining and adhesion including substrates treated with sealers, curing compounds and water repellants etc. Submit a written report of test results to the Consultant.

1.4.2.2. Colour: Submit colours for acceptance in accordance with following general colour hierarchy i.e. Between 2 dissimilar materials, colour the sealant to match the material with the higher relative position on the colour hierarchy scale (highest is at ".1"):

1.4.2.2.1. concrete.

- 1.4.2.2.2. masonry.
- 1.4.2.2.3. metal extrusions.
- 1.4.2.2.4. metal (formed).

1.4.3. Samples: Submit samples in accordance with Section 01 30 00 – Administrative Requirements. Provide cured, colour samples of manufacturer's standard range of colours in each type of sealant and caulking compound for colour selection by the Consultant. Submit samples of primer, bond breaker tape and joint backing material, if requested.

1.5. QUALITY ASSURANCE

1.5.1. Qualifications:

1.5.1.1. Installers: Provide the work of this Section executed by competent installers who have a membership in good standing with SWRI and have a minimum of 5 years' experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.5.1.2. Testing Agencies: An independent testing agency qualified according to ASTM C1021 to conduct testing indicated. Ensure Products are verified by SWRI in accordance with ASTM C719 and ASTM C661.

1.5.2. Preconstruction Testing:

1.5.2.1. Test for compatibility of sealant and accessory Products with joint substrates. Provide test results and written recommendations for primers and substrate preparation required for proper adhesion. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including use of specialty formulated primers.

1.5.2.2. Test elastomeric joint sealants for compliance with requirements of ASTM C920 and where applicable, to other standard test methods.

1.5.2.3. Test elastomeric joint sealants for compliance with requirements of ASTM C719 for adhesion and cohesion under cyclic movement, adhesion-in peel and indentation hardness.

1.5.2.4. Test other joint sealants for compliance with requirements indicated by referencing standard Specifications and test methods.

1.5.3. Include lists of completed Projects with name of Consultants and contact persons.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Delivery and Acceptance Requirements: Deliver caulking and sealant materials to the Site in original, unopened containers with manufacturers' labels and seals intact. Labels shall identify manufacturer's name, brand name of Product, grade and type, application directions and shelf life or expiry date of Product.

1.6.2. Storage and Handling Requirements:

1.6.2.1. Handle and store materials in accordance with the manufacturer's printed directions. Store flammable materials in safe, approved containers to eliminate fire hazards.

1.6.2.2. Do not use caulking and sealant materials that have been stored for period of time exceeding maximum recommended shelf life of materials.

1.7. SITE CONDITIONS

1.7.1. Ambient Conditions:

- 1.7.1.1. Do not apply any sealant under adverse weather conditions, when joints to be sealed are damp, wet or frozen or when at ambient temperatures below 5 deg C (40 deg F). Maintain minimum temperature of application during application and for 8 hours after application. Consult manufacturer for specific instructions before proceeding and obtain the Consultant's approval.
- 1.7.1.2. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated and until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8. WARRANTY

- 1.8.1. Manufacturer Warranty: Warrant work of this Section for period of 20 years for silicone type sealants and 5 years for other sealants against defects and/or deficiencies. Promptly correct any defects or deficiencies which become apparent within the warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include but are not limited to; cracking, crumbling, melting, shrinkage, sag, failure of adhesion, cohesion or reversion, air and moisture leakage, marbling or streaking due to improper mixing, discolouration due to dirt pick-up during curing and staining of adjacent materials.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - 2.1.1.1. ChemRex Inc.; www.chemrex.com
 - 2.1.1.2. CPD Construction Products; www.cpd.com
 - 2.1.1.3. Dow Corning; www.dowcorning.com
 - 2.1.1.4. Euclid Chemical Canada Ltd.; www.euclidchemical.com
 - 2.1.1.5. Momentive Performance Materials; www.momentive.com
 - 2.1.1.6. Sika Canada Inc.; www.sika.ca
 - 2.1.1.7. Tremco Canada; www.tremcosealants.com
 - 2.1.1.8. W.R. Meadows of Canada; www.wrmeadows.com
 - 2.1.1.9. Equivalent

2.2. MATERIALS

2.2.1. Description:

- 2.2.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirement for further requirements.
- 2.2.2. Performance/Design Criteria: Provide exterior and interior elastomeric joint sealants establishing and maintaining water-tight, water resistant and air tight continuous joint seals without staining or deteriorating joint substrates.

- 2.2.3. General: Ensure elastomeric sealants comply with Standards specified in this Section for type, grade, class and uses.
- 2.2.4. Provide Products with capability, when tested for adhesion and cohesion under maximum cyclic movement in accordance with ASTM C719, to withstand required percentage change in joint width existing at time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated.
- 2.2.5. Where elastomeric sealants shall be non-staining to porous substrates, provide Products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for the Project.

Sealant type: Type S - Single component sealant

Type M - Multi-component sealant

Rheological Properties: Grade P - Pourable or self-leveling sealant

Grade NS - Non-sag or gunnable sealant

Movement: Class 100/50 - a sealant which can withstand an increase of at least 100% and a decrease of at least 50% of the joint width as measured at time of application

Class 50 - a sealant which can withstand an increase and a decrease of at least 50% of the joint width as measured at time of application

Class 35 - a sealant which can withstand an increase and a decrease of at least 35% of the joint width as measured at time of application

Class 25 - a sealant which can withstand an increase and a decrease of at least 25% of the joint width as measured at time of application

Class 12 1/2 - a sealant which can withstand an increase and a decrease of at least 12 1/2% of the joint width as measured at time of application

Usage: Use T - sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages

Use NT - sealant designed for use in joints in non-traffic areas

Use I - sealant designed for use in joints which are submerged continuously in a liquid

Us

- 2.2.6. Type B Sealant: Non-sag type, 1 component, mildew resistant silicone containing non-toxic fungicidal agents sealant conforming to ASTM C920, Type S, Grade NS, Class 25, Use NT. Supply in standard colours as selected. Supply one of following:
- 2.2.6.1. "Dow Corning 786" by Dow Corning.
 - 2.2.6.2. "Trade Mate Tub, Tile & Ceramic Silicone Sealant" by Dow Corning.
 - 2.2.6.3. "GE Sanitary SCS1700" by Momentive Performance Materials.
 - 2.2.6.4. "Tremsil 200, white or clear" by Tremco Canada.
 - 2.2.6.5. Equivalent
- 2.2.7. Type C Sealant: Provide one of the following:
- 2.2.7.1. Non-sag type, 1 component, acrylic latex sealant conforming to ASTM C834, Type OP, Grade -18°C. Supply in standard colours as selected. Supply one of following:
 - 2.2.7.1.1. "GE RCS20" by Momentive Performance Materials.
 - 2.2.7.1.2. "Sonolac" by Sonneborn.
 - 2.2.7.1.3. "Tremflex 834" by Tremco Canada.
 - 2.2.7.1.4. Equivalent
 - 2.2.7.2. Non-sag type, multi-component polyurethane sealant conforming to ASTM C920, Type M, Grade NS, Class 50, Use T, I, M, A and O. Supply in standard colours as selected. Supply one of the following:
 - 2.2.7.2.1. "Sonoplastic NP 2" by ChemRex Inc.
 - 2.2.7.2.2. "Eucolastic II" by Euclid Chemical Canada Ltd.
 - 2.2.7.2.3. "Sikaflex -2c NS" by Sika Canada Inc.
 - 2.2.7.2.4. "DYmeric 240" by Tremco Canada.
 - 2.2.7.2.5. Equivalent
 - 2.2.7.3. Non-sag type, 1 component polyurethane sealant conforming to ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A and O. Supply in standard colours as selected. Supply one of the following:
 - 2.2.7.3.1. "Sonoplastic NP1" by ChemRex Inc.
 - 2.2.7.3.2. "Sikaflex -1a" by Sika Canada Inc.
 - 2.2.7.3.3. "DyMonic" and/or "Vulkem 116" by Tremco Canada.
 - 2.2.7.3.4. Equivalent
- 2.2.8. Type D Sealant: Provide one of following:
- 2.2.8.1. Pour grade, 1 component polyurethane sealant conforming to ASTM C920, Type S, Grade P, Class 25, Use T, M, A, I and O. Supply in standard colours as selected. Supply one of following:
 - 2.2.8.1.1. "SL 1" by ChemRex Inc.
 - 2.2.8.1.2. "Sikaflex Self Levelling Sealant" by Sika Canada Inc.

- 2.2.8.1.3. "Vulkem 45" by Tremco Canada.
- 2.2.8.1.4. Equivalent
- 2.2.8.2. Pour grade, multi-component, polyurethane sealant conforming to ASTM C920, Type M, Grade P, Class 25, Use T, M, A, I and O. Supply one of following:
 - 2.2.8.2.1. "NP 2" by ChemRex Inc.
 - 2.2.8.2.2. "Sikaflex 2c SL" by Sika Canada Inc.
 - 2.2.8.2.3. "THC-900/901 or Vulkem 245" by Tremco Canada.
 - 2.2.8.2.4. Equivalent
- 2.2.8.3. Pour grade, 1 component ultra-low modulus, pre-pigmented, neutral cure elastomeric silicone sealant. Supply in standard colours as selected. Supply the following:
 - 2.2.8.3.1. "Dow Corning SL Parking Structure Sealant (Self Leveling)" by Dow Corning.
 - 2.2.8.3.2. "GE Tosseal* 817" by Momentive Performance Materials.
 - 2.2.8.3.3. "Spectrum 900SL Self Leveling Silicone Highway and Parking Structure Sealant" by Tremco Canada.
 - 2.2.8.3.4. Equivalent
- 2.2.8.4. Non-sag type, 1 component low-modulus, pre-pigmented, neutral cure elastomeric silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A and O. Supply in standard colours as selected. Supply one of following:
 - 2.2.8.4.1. "Dow Corning Contractors Concrete Sealant (CCS)" by Dow Corning.
 - 2.2.8.4.2. "Dow Corning NS Parking Structure Sealant (Non-Sag)" by Dow Corning.
 - 2.2.8.4.3. "GE Tosseal* 811" by Momentive Performance Materials.
 - 2.2.8.4.4. "Spectrum 800 Low Modulus Silicone Highway and Parking Structure Sealant" by Tremco Canada.
 - 2.2.8.4.5. Equivalent
- 2.2.9. Type E Sealant: Self-levelling type, epoxy modified joint sealant, cold-applied, 2 component, pour grade, grey colour. Supply one of following:
 - 2.2.9.1. "EP 280 Control Joint Sealant" by ChemRex Inc.
 - 2.2.9.2. "CPD Joint-Flex P.E." by CPD Construction Products.
 - 2.2.9.3. "Loadflex" by Sika Canada Inc.
 - 2.2.9.4. "Rezi-Weld™ Flex" by W.R. Meadows of Canada.
 - 2.2.9.5. "Foil-fast Epoxy Injection Gel" by The RawPlug Co. Inc.
 - 2.2.9.6. Equivalent
- 2.2.10. Joint Primer: Non-staining, suitable for substrate surfaces, compatible with joint forming materials and as recommended by sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- 2.2.11. Joint Backing: Preformed, compressible, resilient, non-waxing, non-extruding, non-staining strips of closed cell polyethylene or urethane foam, compatible with joint substrates and approved by sealant manufacturer based on field experience and laboratory test. Sizes and shapes to suit various conditions, diameter 25% greater than joint width. Ensure backing is compatible with sealant, primer and substrate.
- 2.2.12. Bond Breaker Tape: As recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
- 2.2.13. Masking Tape: Provide non-staining, non-absorbent tapes and sheets which effectively mask substrate without leaving an adhesive residue compatible with joint sealants and surfaces adjacent to joints.
- 2.2.14. Cleaning Material: Non-corrosive, non-staining, solvent type, xylol, MEK, toluol, IPA or as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas free of oily residues and other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants with joint substrates.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions:
 - 3.1.1.1. Examine joints for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealant performance. Ensure joints are suitable to accept and receive sealants.
 - 3.1.1.2. Verify joint surfaces are clean, sound, and free of defects and dimensions are within sealant manufacturer's size requirements.
 - 3.1.1.3. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 3.1.1.4. Do not apply sealant to masonry until mortar has cured.
- 3.1.2. Pre-installation Testing: Before any sealing work is commenced, test materials for indications of staining or poor adhesion.
- 3.1.3. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

- 3.2.1. Protection of In-Place Conditions: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
- 3.2.2. Surface Preparation:
 - 3.2.2.1. Clean joints and spaces which are to be sealed and ensure they are dry and free of dust, loose mortar, oil, grease, oxidation, coatings, form release agents, sealers and other foreign material.
 - 3.2.2.2. Clean porous surfaces such as concrete, masonry or stone by wire brushing, grinding or blast cleaning, mechanical abrading or a combination of these methods as required to obtain clean and sound surfaces.

- 3.2.2.3. Remove laitance by grinding or mechanical abrading.
- 3.2.2.4. Remove oils by sandblast cleaning.
- 3.2.2.5. Remove loose particles present or resulting from grinding, abrading or sandblast cleaning by thorough brushing.
- 3.2.2.6. Clean ferrous metals of rust, mill scale and foreign materials by wire brushing, grinding or sanding.
- 3.2.2.7. Wipe non-porous surfaces such as metal and glass to be sealed, except pre-coated metals, with cellulose sponges or clean rags soaked with ethyl alcohol, ketone solvent, xylol or toluol and wipe dry with clean cloth. Where joints are to be sealed with silicone based sealants clean joint with MEK or xylol. Do not allow solvent to air-dry without wiping. Clean pre-coated metals with solutions or compounds which will not injure finish and which are compatible with joint primer and sealant. Ensure that ferrous metal surfaces are painted before applying sealant.
- 3.2.2.8. Examine joint sizes and where depth of joint exceeds required depth of sealant correct to achieve proper following width/depth ratio:
 - 3.2.2.8.1. Maintain 2:1 Width/Depth Ratio: Ensure maximum sealant depth is 13 mm (1/2) and minimum contact width with each substrate is 6 mm (1/4").
- 3.2.2.9. Install joint backing material to achieve correct, uniform joint profile and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- 3.2.2.10. Do not leave gap between ends of sealant backing; do not stretch, twist, puncture, or tear sealant backings; remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- 3.2.2.11. Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape at back of joint to prevent 3-sided adhesion.
- 3.2.2.12. Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections. Install bond breaker tape at back of joint where joint backing is not required or cannot be installed.
- 3.2.2.13. On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.
- 3.2.2.14. Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.
- 3.2.2.15. Do not exceed shelf life and pot life of materials and installation times, as stated by manufacturer.
- 3.2.2.16. Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.
- 3.2.2.17. Use materials as received from manufacturer, without additions, deletions and adulterations of materials.

- 3.2.2.18. Mix multiple component sealants and bulks sealants using mechanical mixer capable of mixing without mixing air into material, in accordance with manufacturer's directions and recommendations. Continue mixing until material is homogeneously blended, uniform in colour and free from streaks of unmixed material. Install compound prior to start of hardening or curing cycle.
- 3.2.2.19. Prior to painting, seal joints in surfaces to be painted. Where surfaces to be sealed are prime painted in shop before sealing ensure prime paint is compatible with primer and sealant. If they are incompatible, inform Consultant and change primer and sealant to compatible types approved by Consultant.
- 3.2.2.20. Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.
- 3.2.2.21. Prime sides of joints for type of surface being sealed prior to application of joint backing, bond breaker or sealant as recommended by sealant manufacturer.
- 3.2.3. Removal:
 - 3.2.3.1. Remove existing caulking and/or sealant from joints as required.
 - 3.2.3.2. Remove existing caulking and/or sealants including any residual caulking/sealant material using suitable methods to prevent damage to adjacent surfaces. Take care to ensure no damage or visible changes take place to surface of substrate that will not be covered by replacement sealant material.
 - 3.2.3.3. Clean surfaces of joints and spaces in accordance with procedures specified herein under "Surface Preparation".
 - 3.2.3.4. Ensure materials in contact with sealant are compatible.
 - 3.2.3.5. Where required, mask adjacent surfaces prior to priming and application of sealant to prevent staining.
 - 3.2.3.6. Prime inner surfaces of joint, where required, immediately prior to caulking, in accordance with sealant manufacturer's recommendations, to provide full adhesion and to prevent staining of adjacent exposed surfaces.

3.3. APPLICATION

- 3.3.1. Apply in accordance with the manufacturer's directions and recommendations unless more stringent requirements apply.
- 3.3.2. Apply sealant by proven techniques using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant manufacturer.
- 3.3.3. Force sealant into joint and against sides of joints to obtain uniform adhesion. Use sufficient pressure to completely fill voids in joint regardless of variation in joint widths and to proper joint depth as prepared. Ensure full firm contact with interfaces of joint. Superficial pointing with skin bead is not acceptable.
- 3.3.4. Finish face of compound to form smooth, uniform beads. At recesses in angular surfaces, finish compound with flat face, flush with face of materials at each side. At recesses in flush surfaces, finish compound with concave face flush with face of materials at each side.
- 3.3.5. Compound may be tooled, provided such tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.

- 3.3.6. Tool surfaces as soon as possible after sealant application or before any skin formation has occurred, particularly when using silicone sealants.
- 3.3.7. Ensure joint surfaces are straight, neatly finished, free from ridges, wrinkles, sags, dirt, stains, air pockets and embedded foreign matter or other defacement and are uniform in colour, free from marbling and/or colour streaking due to improper mixing or use of out of shelf life Products.
- 3.3.8. Do not use solvent curing sealants indoors.
- 3.3.9. Use one of sealants specified for each type in following locations. Ensure sealant chosen (from several specified under each type under "MATERIALS") for each location is recommended by manufacturer for use for conditions encountered:
 - 3.3.9.1. Type A: Typically used in joints between metal frames and adjacent masonry and/or concrete construction in exterior walls, exterior and interior sides; control and expansion joints in exterior and interior surfaces of poured-in-place concrete walls, precast architectural wall panels and unit masonry walls; sealing of joints between underside of pre-stressed precast concrete floor slabs and masonry; and other locations where sealant is required or noted on Drawings except in locations designated for Type B, C, D, E, F and G and except where sealant is specified in other Sections.
 - 3.3.9.2. Type B: Typically used in joints between urinals and walls, around washrooms accessories, at corners of walls, between splash backs and walls, in shower, damp or wet areas, at ceramic tiles where mildew resistant sealant is required.
 - 3.3.9.3. Type C: Typically used in joints between interior metal and/or wood frames and adjacent construction in interior partitions.
 - 3.3.9.4. Type E (load bearing): Typically used in static joints in horizontal surfaces where self-levelling sealants are required.
- 3.3.10. Joint designation in preceding paragraphs and fact that Drawings do not show all locations to be sealed does not limit responsibility of the Contractor to seal all locations except those indicated in other Sections of work, required to create and ensure continuous enclosure.
- 3.3.11. Firestopping and Smoke Seal: Sealants part of firestopping systems and smoke seals provided within fire rated assemblies are part of work of Section 07 84 00 - Firestopping and Smoke Seals and carried out under supervision of the Contractor.

3.4. REPAIR

- 3.4.1. Repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.5. SITE QUALITY CONTROL

- 3.5.1. Site Tests and Inspections:
 - 3.5.1.1. Independent inspection and testing company may be appointed and paid for by the Owner. .
 - 3.5.1.2. Inspect joints for complete fill, for absence of voids and for joint configuration complying with specified requirements. Record results in a manner acceptable to the Consultant.
 - 3.5.1.3. Tests may include sampling of installed Product where adhesion, cohesion or reversion failure is suspected.

- 3.5.1.4. Where work or materials fail to meet requirements as indicated by test results, pay costs of additional inspection and testing required for new replacement work or materials.
- 3.5.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.
- 3.5.3. Manufacturer Services:
 - 3.5.3.1. Prior to commencement of sealing, arrange for sealant manufacturer's technical representative to visit the Place of the Work and inspect surfaces and joints to be sealed.
- 3.6. CLEANING**
 - 3.6.1. Immediately clean adjacent surfaces which have been soiled and leave work in neat, clean condition. Remove excess materials, compounds smears and other soiling resulting from application of sealants. Use recommended cleaners and solvents. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.
- 3.7. PROTECTION**
 - 3.7.1. Provide approved, non-staining means of protection for completed joint sealant installations where required to protect work from mechanical, thermal, chemical and other damage by construction operations and traffic.
 - 3.7.2. Maintain protection securely in place until Substantial Performance of the Contract is achieved. Remove protection when so directed by the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide steel doors and frames including but not limited to following:
- 1.2.1.1. supply of hollow metal door frames.
 - 1.2.1.2. supply of hollow metal transom panels.
 - 1.2.1.3. supply of hollow metal frames and mullions for borrowed lights and glazed screens.
 - 1.2.1.4. preparation of hollow metal doors and frames for finish hardware.
 - 1.2.1.5. glazing stops.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Hanging door and installation of finish hardware: Section 06 90 00 - General Installations.
 - 1.2.2.2. Caulking and/or sealing door frames: Section 07 92 00 - Joint Sealants.
 - 1.2.2.3. Supply of finish hardware: Section 08 71 00 - Finish Hardware.
 - 1.2.2.4. Provision of glazing: Section 08 80 00 - Glass and Glazing.
 - 1.2.2.5. Finish painting: Section 09 91 00 - Painting.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. CSDMA: Canadian Steel Door Manufacturers Association; www.csdma.org.
 - 1.3.1.2. OBC: Ontario Building Code.
 - 1.3.1.3. PVC: Polyvinyl-Chloride.
 - 1.3.1.4. RRPC: Resin Reinforced Polychloroprene.
 - 1.3.1.5. STC: Sound Transmission Class.
 - 1.3.1.6. TL: Transmission Loss.
 - 1.3.1.7. TRR: Temperature Rated Rise.
 - 1.3.1.8. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
- 1.3.2. Reference Standards:
- | | | |
|----------|-----------------|---|
| 1.3.2.1. | ANSI A115.1G-94 | Installation Guide for Doors and Hardware |
| 1.3.2.2. | ANSI A224.1-94 | Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames |
| 1.3.2.3. | ANSI A250.4-94 | Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings |

- | | | |
|-----------|---------------------|--|
| 1.3.2.4. | ASTM A568/A568M-07a | Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, |
| 1.3.2.5. | ASTM A653/A653M-08 | Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| 1.3.2.6. | ASTM C177-04 | Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus |
| 1.3.2.7. | ASTM C518-04 | Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus |
| 1.3.2.8. | ASTM E90-04 | Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements |
| 1.3.2.9. | ASTM E413-04 | Classification for Rating Sound Insulation |
| 1.3.2.10. | CGSB 41-GP-19Ma | Rigid Vinyl Extrusions for Windows and Doors |
| 1.3.2.11. | CAN/CGSB-82.5-M88 | Insulated Steel Doors |
| 1.3.2.12. | CSA W59-03(08) | Welded Steel Construction (Metal Arc Welding) |
| 1.3.2.13. | NAAMM-HMMA 840-07 | Guide Specification for Installation of Hollow Metal Doors and Frames |
| 1.3.2.14. | NFPA 80-07 | Standard for Fire Doors and Fire Windows |
| 1.3.2.15. | NFPA 252-08 | Standard for Fire Tests of Door Assemblies |
| 1.3.2.16. | NFPA 257-07 | Standard for Fire Tests of Window Assemblies and Glass Block Assemblies |
| 1.3.2.17. | CAN4-S104-M80(85) | Standard Method for Fire Tests of Door Assemblies |
| 1.3.2.18. | CAN4-S105-M85(92) | Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104 |
| 1.3.2.19. | CAN4-S106-M80(85) | Standard Method for Fire Test of Window and Glass Block Assemblies |
| 1.3.2.20. | CAN/ULC-S702-97 | Standard for Mineral Fibre Thermal Insulation for Buildings |

1.4. ADMINISTRATIVE REQUIREMENTS

- 1.4.1. Scheduling: Submit a schedule indicating each frame related to the doors and frames shown on the Drawings.

1.5. SUBMITTALS

- 1.5.1. Shop Drawings: Submit Shop Drawings in accordance with Section 01 30 00 – Administrative Requirements. Show each type of frame, metal thicknesses and finishes, openings (glazed and/or

louvred), fire ratings, location of exposed fasteners, cutouts, hardware blanking, reinforcing, tapping and drilling arrangements. Show large scale frame sections and anchoring details. Submit door and frame schedule identifying each unit. Ensure each unit bears legible identifying mark corresponding to that listed in the Door and Frame Schedule.

- 1.5.2. Samples: Submit samples in accordance with Section 01 30 00 – Administrative Requirements. Provide one cut-away corner sample minimum 300 mm (12") square for each type of door to indicate the following:

1.5.2.1. frame.

1.6. QUALITY ASSURANCE

- 1.6.1. Qualifications:

1.6.1.1. Manufacturers: Execute the work of this Section by a manufacturer who is a member of CSDMA.

1.7. DELIVERY, STORAGE AND HANDLING

- 1.7.1. Delivery and Acceptance Requirements:

1.7.1.1. Protect frames during shipping.

1.7.1.2. Note damage incurred during shipping.

- 1.7.2. Storage and Handling Requirements:

1.7.2.1. Protect doors and frames during storage.

1.7.2.2. Store and protect materials in accordance with NAAMM-HMMA 840. Coordinate this requirement with the requirements of Section 06 90 00 – General Installations for installing doors.

1.7.2.3. Remove wrappings and coverings from doors upon delivery at Site. Store doors in vertical position, spaced by blocking to permit air circulation between them.

1.8. WARRANTY

- 1.8.1. Manufacturer Warranty: Warrant work manufactured from ASTM A653/A653M, A40 galvanized steel, touched up only with zinc-rich rust inhibitive primer where coating was removed during its manufacture for period of 10 years against defects and/or deficiencies. Promptly correct any defects or deficiencies which become apparent within the warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include but are not limited to; rust perforation when stored, installed and finish painted in accordance with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

- 2.1.1.1. Ali-Porte Inc.; www.aliporte.com
- 2.1.1.2. Artek Door Limited; www.artekdoor.com
- 2.1.1.3. Baron Metal; www.baronmetal.com
- 2.1.1.4. Daybar Industries Limited; www.daybar.com
- 2.1.1.5. Fleming Door Products Ltd.; www.flemingdoor.com
- 2.1.1.6. Metal Door Ltd.; www.metaldoorltd.com
- [2.1.1.7. Equivalent](#)

2.2. MATERIALS

2.2.1. Description:

- 2.2.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.
- 2.2.1.2. Ensure Product quality meets standards set by CSDMA.

2.2.2. Sheet Steel: Commercial grade steel conforming to ASTM A568/A568M, Class 1, hot-dip galvanized conforming to ASTM A653/A653M, ZF120 (A40), known commercially as "Colourbond", "Satincoat", or "Galvanneal". Steel sheet thicknesses specified are base metal thicknesses prior to galvanizing.

2.2.3. Frame Anchors:

- 2.2.3.1. Floor Anchors: Minimum 3 mm (1/8") thick adjustable base anchors with 2 holes for bolting to floor.
- 2.2.3.2. Wall Anchors:
 - 2.2.3.2.1. Masonry T-strap Type Wall Anchors: Minimum 1.2 mm thick (18 ga) steel
 - 2.2.3.2.2. Existing Masonry/Concrete Wall Type Anchors: Minimum 0.912 mm thick (20 ga) steel.
 - 2.2.3.2.3. Masonry Stirrup-strap Type 50 mm x 250 mm (2" x 10"): Minimum 1.519 mm thick (16 ga) steel.
 - 2.2.3.2.4. Steel/Wood Stud Type: Minimum 0.912 mm thick (20 ga) steel.
 - 2.2.3.2.5. Steel/Wood Stud Tension and Associated Wall Type: Minimum 0.912 mm thick (20 ga) steel.

2.2.4. Fire Rated Door and Frame Assemblies: Conform to CAN4-S104-M, CAN4-S105-M, NFPA 80 and NFPA 252.

2.2.5. Fabrication:

- 2.2.5.1. Welding: Carry out welding in accordance with CSA W59.
- 2.2.5.2. Grind exposed welds smooth and flush. Fill open joints, seams and depressions with filler or by continuous brazing or welding. Grind smooth to true sharp arises and profiles and sand down to smooth, true, uniform finish.
- 2.2.5.3. Hardware Requirements: Blank, mortise, reinforce, drill and tap doors and frames to receive mortised templated hardware. Check hardware list for requirements.

2.2.5.4. Frames - General:

- 2.2.5.4.1. Fabricate frames for doors, screens and borrowed lights to profiles indicated.
 - 2.2.5.4.2. Reinforce frame as required for surface mounted hardware. For door frames wider than 1500 mm (5'), reinforce door frame head and jamb and mullions at junction of head.
 - 2.2.5.4.3. Protect mortise cut outs with mortar guard boxes. Omit for gypsum board applications.
 - 2.2.5.4.4. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb. Provide 2 anchors for rebate opening heights up to and including 1500 mm (5') and 1 additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated otherwise below. For frames in previously placed concrete, masonry or structural steel provide anchors located not more than 150 mm (6") from top and bottom of each jamb and intermediate anchors at 660 mm (26") on centre maximum.
 - 2.2.5.4.5. Where floor finishes allow, fabricate frames to extend 38 mm (1-1/2") below finished floor level. Where frames are to terminate at finished floor level, provide plates for anchorage to slabs.
 - 2.2.5.4.6. Prepare each door opening for single stud door silencers: 3 for single door openings placed opposite hinges; 2 for double door openings approximately 150 mm (6") each side of centreline of head stop.
 - 2.2.5.4.7. Supply removable portion of stop and frame where required for overhead concealed door closers and properly connect to frame and prepare for attachment to closer prior to shipment.
 - 2.2.5.4.8. Provide 0.912 mm thick (20 ga) steel snap-in or welded-in "Z" type stud anchors for door frames installed in steel stud gypsum board partitions. Ensure snap-in clips are supplied to Subcontractor performing work under Section 09 21 16.
 - 2.2.5.4.9. Fabricate thermally broken door frames in accordance with Shop Drawings. Provide wall and floor anchors suitable for installation conditions. Anchoring devices must not permit thermal conductivity from exterior frames to interior frame sections. Provide thermal break to separate interior and exterior frame sections.
 - 2.2.5.4.10. Factory apply touch-up primer to areas where zinc coating has been removed during fabrication.
- 2.2.5.5. Hollow Metal Door Frames and Transom Frames:
- 2.2.5.5.1. Steel:
 - 2.2.5.5.1.1. Interior: Minimum 1.519 mm thick (16 ga) steel.
 - 2.2.5.5.2. Reinforcements:
 - 2.2.5.5.2.1. Lock and Strike Reinforcements: Minimum 1.519 mm thick (16 ga) steel.

- 2.2.5.5.2.2. Hinge Reinforcements: Minimum 3.4 mm thick (10 ga) steel.
- 2.2.5.5.2.3. Flush Bolt Reinforcement: Minimum 1.519 mm thick (16 ga) steel.
- 2.2.5.5.2.4. Reinforcement for Surface Applied Hardware: Minimum 1.2 mm thick (18 ga) steel.
- 2.2.5.5.2.5. Concealed Door Closer or Holder Reinforcements: Minimum 2.6 mm thick (12 ga) steel.
- 2.2.5.5.2.6. Top and Bottom End Channels: Minimum 1.2 mm thick (18 ga) steel.
- 2.2.5.5.3. Jamb Spreaders: Minimum 0.912 mm thick (20 ga) steel.
- 2.2.5.6. Sidelight and Window Frame Assemblies:
 - 2.2.5.6.1. Steel: Minimum 1.519 mm thick (16 ga) steel.
 - 2.2.5.6.2. Glazing Stops: Minimum 0.912 mm thick (20 ga) steel, formed, drilled and countersunk for fastenings.
- 2.2.5.7. Welded Type Frames:
 - 2.2.5.7.1. Mitre corners of frames. Cut frame mitres accurately and weld continuously on returns and inside of frame faces.
 - 2.2.5.7.2. When required due to Site access or due to shipping limitations, fabricate frame Product for large openings in sections, with splice joints for field assembly. Indicate joints for field assembly on Shop Drawings.
 - 2.2.5.7.3. Accurately cope and securely weld butt joints of mullions, transom bars, centre rails and sills. Grind welded joints to a smooth, uniform finish.
 - 2.2.5.7.4. Securely attach floor anchors to inside of each jamb profile.
 - 2.2.5.7.5. Weld in 2 temporary jamb spreaders at each frame to maintain alignment during shipment.
 - 2.2.5.7.6. Use formed channel glazing stops, minimum 16 mm (5/8") in height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- 2.2.5.8. Prime Painting: Apply factory touch up primer at areas where zinc coating has been damaged during fabrication.

2.3. SOURCE QUALITY CONTROL

- 2.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

PART 3 - EXECUTION

3.1. INSTALLATION

- 3.1.1. Supply steel frames to Subcontractor performing work under Section 06 90 00 – General Installations for installation.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide wood doors including but not limited to following:
- 1.2.1.1. wood doors.
 - 1.2.1.2. glass stops.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Installation of wood doors and finish hardware: Section 06 90 00 - General Installations.
 - 1.2.2.2. Supply steel door frames: Section 08 11 13 - Steel Doors and Frames.
 - 1.2.2.3. Supply of finish hardware: Section 08 71 00 - Finish Hardware.
 - 1.2.2.4. Glazing: Section 08 80 00 - Glass and Glazing.
 - 1.2.2.5. Setting steel door frames in gypsum board partitions: Section 09 21 16 - Gypsum Board.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. AWI/AWMAC/WI: American Woodwork Institute/Architectural Woodwork Manufacturers Association of Canada/Woodwork Institute; www.awmac.com.
 - 1.3.1.2. AWS: Architectural Woodwork Standards, Edition 1, 2009.
 - 1.3.1.3. FSC: Forest Stewardship Council; www.fsccanada.org.
 - 1.3.1.4. HVAC: Heating, Ventilating and Air Conditioning.
 - 1.3.1.5. ITS: (Warnock Hersey) - Certification Listings for Fire Doors.
 - 1.3.1.6. MDO: Medium Density Overlay.
 - 1.3.1.7. MSDS: Material Safety Data Sheets.
 - 1.3.1.8. OBC: Ontario Building Code.
 - 1.3.1.9. VOC: Volatile Organic Compound.
- 1.3.2. Reference Standards:
- 1.3.2.1. ANSI/WDMA I.S. 1A-04 Industry Standard for Architectural Flush Wood Doors
 - 1.3.2.2. ANSI/WDMA I.S. 6A-08 Industry Standard for Architectural Stile and Rail Doors
 - 1.3.2.3. ASTM E90-04 Standard Test Method for Laboratory Measurement of Sound Transmission Loss of Building Partitions
 - 1.3.2.4. ASTM E413-04 Classification for Rating Sound Insulation

- 1.3.2.5. CAN/CGSB-11.3-M87 Hardboard
- 1.3.2.6. CSA O112 Series-M77 CSA Standards for Wood Adhesive
- 1.3.2.7. CAN4-S104-M80(85) Standard Method for Fire Tests of Door Assemblies
- 1.3.2.8. CAN4-S113-79(00) Standard Specification for Door, Wood Core, Meeting the Performance Required by CAN4-S104 for Twenty Minute Fire Rated Closure Assemblies
- 1.3.2.9. NFPA 80-07 Standard for Fire Doors and Fire Windows
- 1.3.2.10. NFPA 252-08 - Standard Methods of Fire Tests of Door Assemblies
- 1.3.2.11. UL 10B - Underwriters Laboratories Fire Tests for Door Assemblies

1.4. SUBMITTALS

1.4.1. Shop Drawings:

- 1.4.1.1. Submit Shop Drawings in accordance with Section 01 30 00 – Administrative Requirements.
- 1.4.1.2. Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special bevelling, special blocking for hardware, identify cut outs for glazing and other openings.
- 1.4.1.3. Submit Product data indicating door core materials and construction and face type wood veneer.
- 1.4.1.4. 12"x12" wood veneer sample to be provided to the Region for approval prior to supply/install.

1.5. QUALITY ASSURANCE

1.5.1. Qualifications:

- 1.5.1.1. Provide the work of this Section in accordance with Section 9 of AWS produced by AWI/AWMAC/WI, except as specified otherwise herein, and by reference are hereby made a part of this Section. Ensure any reference to grades and terminology in this Section is as defined in AWS.
- 1.5.1.2. Requirements of this Section govern and modify AWS.
- 1.5.1.3. Installers: Provide the work of this Section executed by competent installers with a minimum of 5 years' experience in the application of Products, systems and assemblies specified and be a member of AWI/AWMAC/WI.

1.6. DELIVERY, STORAGE AND HANDLING

1.6.1. Delivery and Acceptance Requirements:

- 1.6.1.1. Do not subject interior wood doors to extremes in either heat or humidity. Do not accept delivery to the Site until HVAC systems are operational and balanced, providing temperature range of 10 deg C to 32 deg C (50 deg F to 90 deg F) and 25% to 55% relative humidity.
- 1.6.1.2. Accept doors at the Site in the manufacturer's standard packaging.

1.6.2. Storage and Handling Requirements: Store and protect wood doors in accordance with the manufacturer's recommendations and ANSI/WDMA I.S. 1A's Appendix Section "Care and Installation at Job Site". Ensure that a Subcontractor responsible for receiving and storing wood doors has a copy of ANSI/WDMA I.S.1A.

1.7. WARRANTY

- 1.7.1. Manufacturer Warranty: Warrant the work of this Section against defects and deficiencies for a period of 3 years. Promptly correct defects and deficiencies which become apparent during the warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include, but are not limited to, bubbling, delamination of faces, or edges, warp, twist bow exceeding 6 mm (1/4") and telegraphing of core. "Correct" referred to herein includes labour and materials for removal, repair, refinishing and replacement of Products provided as part of the work of this Section, installing hardware, finishing, hanging and fitting.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Door Schedule and Specifications:

- 2.1.1.1. Baillargeon; www.baillargeondoors.com
2.1.1.2. Cambridge Door Company Ltd.; www.cambridgedoor.com
2.1.1.3. Lambton Doors; www.lambtondoors.com
2.1.1.4. Marshfield Door Systems, Inc.; www.marshfielddoors.com

[2.1.1.6. Equivalent](#)

2.2. MATERIALS

- 2.2.1. Description:

- 2.2.1.1. Regulatory Requirements:

- 2.2.1.1.1. Ensure wood doors comply with AWI/AWMAC/WI, Section 9 or ANSI/WDMA I.S. 1A.

- 2.2.2. Conform to AWI/AWMAC/WI, Section 9 or ANSI/WDMA I.S. 1A for wood flush doors and AWI/AWMAC/WI, Section 9 or ANSI/WDMA I.S. 6A for stile and rail doors, except as specified otherwise herein.

- 2.2.3. Supply wood doors from same manufacturer.

- 2.2.4. Solid Wood Core Wood Flush Doors:

- 2.2.4.1. Construction: 7 ply.
2.2.4.2. Fire Rating: Unrated.
2.2.4.3. Core: Kiln dried soft wood blocks; relative density not less than 0.30 at 12% moisture content; of random lengths placed vertically or horizontally not exceeding 50 mm (2") wide; staggered laminated by heat and pressure.
2.2.4.4. Stiles: Minimum 107 mm (4-3/16") low density laminated wood including a 22 mm (7/8") hardwood to match face.
2.2.4.5. Top and Bottom Rails: Minimum 85 mm (3-5/16") low density laminated wood.
2.2.4.6. Supply of Hardware for the sliding door is to be taken from the cash allowance but installation is to be part of this Contract.

- 2.2.5. Vision Frames for Unrated Doors: Wood, of same species as door; channel shape; mitre corners; prepared for countersink style screws.
- 2.2.6. Fabrication:
 - 2.2.6.1. Fabricate flush doors in accordance with AWI/AWMAC/WI, Section 9 or ANSI/WDMA I.S. 1A and CAN4-S113 and stile and rail doors in accordance with AWI/AWMAC/WI, Section 9 or ANSI/WDMA I.S. 1A except as specified otherwise herein.
 - 2.2.6.2. Size doors for 3 mm (1/8") clearance of heads and jambs and 9 mm (3/8") at bottom.
 - 2.2.6.3. Bevel vertical edges of single acting doors 3 mm in 50 mm (1/8" in 2") on lock side and 1.5 mm in 50 mm (1/16" in 2") on hinge side.
 - 2.2.6.4. Radius vertical edges of double acting doors to 60 mm (2-3/8") radius.
 - 2.2.6.5. Flush Doors:
 - 2.2.6.5.1. Fabricate solid core doors using hot or cold press construction technology. Bond stiles and rails to core using Type I or II adhesive. Sand for uniform thickness. Laminate door facing, crossbanding and assembled core in hot or cold press.
 - 2.2.6.5.2. Provide hardwood glass stops, finished to match face veneer, for vision panels in un-rated doors
 - 2.2.6.5.3. Factory fit doors for frame opening dimensions identified on Shop Drawings.
 - 2.2.6.6. Finish:
 - 2.2.6.6.1. Wood veneer doors to be Grade 1/Grade 'A' booked matched medium walnut to match WV-1. General Contractor to provide colour matching sample for Architect's review
 - 2.2.6.6.2. Factory finish doors in accordance with AWI/AWMAC/WI, Section 5, System -11, Polyurethane, catalyzed or ANSI/WDMA I.S. 1A, TR-6 & OP-6 Catalyzed Polyurethane; clear coat finish, stain colour and sheen as selected by the Consultant.

2.3. SOURCE QUALITY CONTROL

- 2.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

PART 3 - EXECUTION

3.1. INSTALLATION

- 3.1.1. Installation of wood doors and finish hardware forms part of the work of Section 06 90 00 – General Installations.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Supply finish hardware including but not limited to following:
- 1.2.1.1. pressed steel frames.
 - 1.2.1.2. steel doors.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Provision of hardware for cabinetry work: Section 06 40 00 - Architectural Woodwork.
 - 1.2.2.2. Installation of finish hardware: Section 06 90 00 - General Installations.
 - 1.2.2.3. Supply of hollow metal doors and frames: Section 08 11 13 - Steel Doors and Frames.
 - 1.2.2.4. Supply of wood doors: Section 08 14 00 - Wood Doors.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. AHC: Architectural Hardware Consultant.
 - 1.3.1.2. BHMA: Builders Hardware Manufacturers Association; www.buildershardware.com.
 - 1.3.1.3. CSA: Canadian Standards Association; www.csa.ca.
 - 1.3.1.4. DHI: Door and Hardware Institute Canada; www.dhicanada.ca.
 - 1.3.1.5. NFPA: National Fire Protection Association; www.nfpa.org.
 - 1.3.1.6. UL: Underwriters' Laboratories Inc.; www.ul.com.
 - 1.3.1.7. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
- 1.3.2. Reference Standards:
- 1.3.2.1. NFPA 80-07 Standard for Fire Doors and Fire Windows
 - 1.3.2.2. CAN4-S104-M80(85) Standard Method for Fire Tests of Door Assemblies
 - 1.3.2.3. CAN4-S105-M85(92) Standard Specification for Fire Door Frames Meeting the
Performance Required by CAN4-S104

1.4. SUBMITTALS

1.4.1. Shop Drawings:

- 1.4.1.1. Submit Shop Drawings for hardware installation in accordance with Section 01 30 00 – Administrative Requirements.
- 1.4.1.2. Submit Shop Drawings in schedule form, prepared by an AHC, indicating manufacturers' names, Product descriptions, makes, models, materials, finishes, functions, location of each item, complete keying schedule and other pertinent information. Repeat hardware item numbers used in Finish Hardware Schedule. Include list of abbreviations and finish symbols and their meaning. Include manufacturer's cut sheets for each hardware item.

1.4.2. Samples:

- 1.4.2.1. Submit samples in accordance with Section 01 30 00 - Administrative Requirements..
- 1.4.2.2. Do not order hardware from manufacturer until samples have been approved by the Consultant. Hardware and finishes supplied shall be identical to approved samples.
- 1.4.2.3. Supply 1 of each item of hardware with specified finishes to the Consultant. Label each sample as to manufacturer, type, finishes, size and location for use proposed. Approved samples will be retained for comparison and returned upon completion of the Work.
- 1.4.2.4. Do not submit substitutions to accepted alternates.

1.5. CLOSEOUT SUBMITTALS

1.5.1. Operational and Maintenance Data:

- 1.5.1.1. Instruct the Owner's designated representative in proper care and preventative maintenance of hardware to assure longevity of operation.
- 1.5.1.2. Provide 3 copies of descriptive information, operating, adjustment and maintenance instructions and "As-Built" record of location of each hardware group and other pertinent information.
- 1.5.1.3. Provide maintenance data, parts list and manufacturer's instructions for each type of door closer, lockset, fire exit hardware and door holder. Provide manufacturer's instructions for proper care of hardware, including lubrication, for incorporation into operation and maintenance instruction manual.
- 1.5.1.4. Provide this information in 3-ring binders suitably identified in accordance with requirements of Section 01 70 00 – Execution and Closeout Requirements.

1.6. MAINTENANCE MATERIAL SUBMITTALS

- 1.6.1. Tools: Prior to date of Substantial Performance of the Contract, supply a complete set of specialized tools as needed for the Owner's continued adjustment, maintenance and removal and replacement of builders hardware.

1.7. QUALITY ASSURANCE

1.7.1. Qualifications:

- 1.7.1.1. Suppliers: A recognized architectural door hardware supplier for exit devices, cylinders, power supply, magnetic holders and similar items that has a record of successful in-service performance for supplying door hardware similar in quantity, type and quality to that indicated for this Contract and employs an experienced AHC who is available to the Owner, the Consultant and the Contractor at reasonable times during course of the Work for consultation.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Delivery and Acceptance Requirements: Supply scheduled hardware to the Place of the Work.

1.8.2. Storage and Handling Requirements:

- 1.8.2.1. Pack hardware in suitable wrappings and containers to protect from damage during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Pack screws, bolts and fastenings necessary for proper installation in same package. Mark packages for easy identification legibly indicating manufacturer's numbers, types, sizes. Markings must include floor, item number and door number.
- 1.8.2.2. Provide assistance in counting hardware on major shipments to confirm hardware is shown as shipped. Provide inventory list with Finish Hardware Schedule. Obtain assistance from hardware supplier to confirm hardware has been delivered to Site correctly for all major shipments. Be responsible to unload hardware, to check hardware shipments and to set up shelving and organize hardware room.
- 1.8.2.3. Provide templates, template information, installation instructions and details necessary for preparation and installation of hardware.
- 1.8.2.4. Provide 3 copies of installation instructions for hardware supplied.

1.9. WARRANTY

- 1.9.1. Manufacturer Warranty: Warrant the work of this Section for period of 2 years for general, 10 years for closers and lifetime for butt hinges against defects and/or deficiencies.. Promptly correct any defects or deficiencies which become apparent within warranty period including Making Good any work damaged by this work, to satisfaction of the Consultant and at no expense to the Owner.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Description:

- 2.1.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.

2.1.2. Finish Hardware:

- 2.1.2.1. Products specified in this Section are for installation guidance to suit the Contract design requirements as applicable. NOTE! Supply of hardware is by cash allowance. Installation is to be included as part of the work of this Contract.

- 2.1.2.2. Hardware shall match existing hardware in type, manufacturer and finish, except where noted otherwise in the specifications herein.
- 2.1.2.3. Provide door closers, locksets and latchsets meeting ANSI/BHMA Qualified Products List. Provide finish hardware in accordance with Finish Hardware Schedule. No substitutions are allowed without written approval of the Consultant.
- 2.1.3. Fastenings:
 - 2.1.3.1. Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
 - 2.1.3.2. Exposed fastening devices shall match finish of hardware.
 - 2.1.3.3. Use fasteners with material through which they pass.
- 2.1.4. Keying:
 - 2.1.4.1. Key locks to the Owner's requirements (construction master keyed, grand master keyed, sub- master keyed, as directed).
 - 2.1.4.2. Provide interchangeable cores to the Owner's grand master key system. Number of keys to be determined by the Owner. Provide a minimum of 2 cut keys per cylinder, but coordinate the "maximum" quantity per key group with the Owner before ordering final amounts.
 - 2.1.4.3. Provide operational brass construction cores for locks and cylinders. Cores shall be returned to manufacturer when permanent cores are provided.
 - 2.1.4.4. Include and provide for cost of permanent cores.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions:
 - 3.1.1.1. Before supplying any hardware and installation instructions, carefully check the Drawings for work requiring hardware, verify door swings, door and frame materials and operating conditions and assure hardware will fit work to be attached.
 - 3.1.1.2. Check Shop Drawings and frame and door lists affecting hardware type and installation, and verify to correctness thereof, or advise of required revisions. Ensure doors, frames and panels requiring additional support are reinforced.
 - 3.1.1.3. Point out special requirements to installer and ensure final adjustment of hardware, in particular closer arms, valves and locksets, has all been done properly.
 - 3.1.1.4. Check and confirm dimensions for hardware for this Contract, including door protection, overhead stop sizes, exit devices, power door operators and other related hardware items that may require coordination for sizing.

3.2. INSTALLATION

- 3.2.1. Supply finish hardware to the Subcontractor performing work under Section 06 90 00 – General Installations for installation.

3.3. SITE QUALITY CONTROL

- 3.3.1. Site Tests and Inspections: After installation, have hardware inspected by manufacturer's representative, an experienced AHC who is a member of DHI, who shall certify in writing with a copy to the Consultant, items and their installation are in accordance with Specification requirements and are functioning properly and notify the Consultant of any cases where it has not been properly installed, is defective or is not as specified. Replace or re-install defective or improperly installed hardware at no cost to the Owner.
- 3.3.2. Supervision: Provide following **C o n t r a c t** services relative to the Contract co-ordination, supervision and inspection:
- 3.3.2.1. Provide services of AHC familiar with type of work being performed, with type of the Contract, for preparation of hardware Shop Drawings (schedule), keying, coordination with other trades, consultation with the Owner and the Consultant and for performing on-site inspections
 - 3.3.2.2. Inspect to verify hardware has been properly installed and is functioning satisfactorily.
 - 3.3.2.3. Recommend adjustments.
 - 3.3.2.4. Replace defective hardware.
 - 3.3.2.5. Check door closers after installation to ensure adjustment such as backchecking degree has been properly made and if not, make such adjustments or instruct those installing hardware to make these adjustments.
 - 3.3.2.6. Submit 6 copies of the finalized schedule to the Consultant for acceptance. Provide additional copies as required for the Contract and office use.

END OF SECTION

FINISHING HARDWARE SCHEDULE

Mosiac House Commercial Space Fit up. **5676 Main st Whitchurch-Stouffville**

Architect

G. Bruce Stratton Architects

Detailer: **AUSTIN BARIL**

Consultant: **ROSS RUPRECHT B.A., A.H.C.**

Submittal Date: **April 14/26**



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosiac House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

Manufacturers & Finishes

Manufacturers

Camden
CBH
GYRO-TECH
HES
Ives
LCN
MISC
Schlage
UNK
Von Duprin

Finishes

626 - Satin chromium plated
over nickel
628 - Satin aluminum, clear
anodized
630 - Satin stainless steel
652 - Satin chromium plated
over nickel
689 - Aluminum painted
US26D - Satin chromium plated
over nickel
US32D - Satin stainless steel



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosiatic House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

Openings Schedule

[illegible]

Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosiac House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

GENERAL

AUTO OPERATORS MFTG. BY GYRO-TECH NO ALTERNATE WILL BE ACCEPTED.



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosiac House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

Hardware Schedule

Heading #1 (Group: E01)

Item #1

1 Elevation E01, EXTERIOR FROM VEST

100° RHR

___ x ___ x ___ - EXIST DR x EXIST FR

EXISTING DOOR & FRAME.

RE USE EXISTING HARDWARE EXCEPT AS NOTED.

CONFIRM ELECTRIC STRIKE IS COMPATIBLE WITH EXISTING LATCHING HARDWARE BEFORE ORDERING.

1	Electric Strike	Von Duprin 6300- CON 24VAC -630	630
1	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 X FWH CA 628 NO ALTERNATE	628
1	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
2	Accessory	Camden CM-60/4	
2	Accessory	Camden CM-89S	
1	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	
1	Miscellaneous Hardware	Camden CX-12PLUS	
1	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

THIS HARDWARE SUPPLIER SECTION 08710 TO SUPPLY AND INSTALL AUTO OPERATOR.

DIV 16 ELECTRICAL CONTRACTOR TO PROVIDE 120VAC TO FRAME HEADER AND SUPPLY & INSTALL ALL LVW IN CONDUIT TO ALL ACTUATORS AND ELECTRICAL COMPONENTS LISTED IN THE HARDWARE SCHEDULE. REFER TO WIRING / RISER DIAGRAM SUPPLIED BY HARDWARE SUPPLIER



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosaic House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

Heading #2 (Group: EXISTING ADO CR)

Item #2

1 Elevation E02, VEST FROM ENTRY

90° RHR

___ x ___ x ___ - EXIST DR x EXIST FR

EXISTING DOOR & FRAME.

RE USE EXISTING HARDWARE EXCEPT AS NOTED.

CONFIRM ELECTRIC STRIKE IS COMPATIBLE WITH EXISTING LATCHING HARDWARE BEFORE ORDERING.

1	Electric Strike	Von Duprin 6400- Shim-630	630
		CONFIRM MODEL BEFORE ORDER	
1	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 X FWH CA 628 NO ALTERNATE	628
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
2	Accessory	Camden CM-60/4	
2	Accessory	Camden CM-89S	
1	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	
1	Miscellaneous Hardware	Camden CX-12PLUS	
1	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

THIS HARDWARE SUPPLIER SECTION 08710 TO SUPPLY AND INSTALL AUTO OPERATOR.

DIV 16 ELECTRICAL CONTRACTOR TO PROVIDE 120VAC TO FRAME HEADER AND SUPPLY & INSTALL ALL LVW IN CONDUIT TO ALL ACTUATORS AND ELECTRICAL COMPONENTS LISTED IN THE HARDWARE SCHEDULE. REFER TO WIRING / RISER DIAGRAM SUPPLIED BY HARDWARE SUPPLIER



Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosiatic House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

Heading #3 (Group: E03)

Item #3	1 Elevation E03, CORR TO FLEX SPACE		100° LH
	___ x ___ x ___ - EXIST DR x EXIST FR		
	EXISTING DOOR & FRAME. RE USE EXISTING HARDWARE EXCEPT AS NOTED. CONFIRM MODEL OF ELECTRIC STRIKE IS COMPATIBLE WITH EXISTING LATCHING HARDWARE.		
1	Electric Strike	Von Duprin 6400- Shim-630 CONFIRM MODEL BEFORE ORDER	630
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	



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Heading #4 (Group: PASSAGE ADO PUSH)

Item #4

1 Single door 03, ENTRY FROM FLEX SPACE

90° RHR

965 x 2440 x 45 - WD DR x HM FR

4	Standard Hinge	Ives 5BB1 4.5 x 4 " 652	652
1	Latchset	Schlage ND10S RHO	626
1	Electric Strike	Von Duprin 6400- Shim-630	630
1	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 X FWH CA 628 NO ALTERNATE	628
1	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
2	Accessory	Camden CM-60/4	
2	Accessory	Camden CM-89S	
1	Miscellaneous Hardware	Camden CX-12PLUS	
1	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

THIS HARDWARE SUPPLIER SECTION 08710 TO SUPPLY AND INSTALL AUTO OPERATOR.

DIV 16 ELECTRICAL CONTRACTOR TO PROVIDE 120VAC TO FRAME HEADER AND SUPPLY & INSTALL ALL LVW IN CONDUIT TO ALL ACTUATORS AND ELECTRICAL COMPONENTS LISTED IN THE HARDWARE SCHEDULE. REFER TO WIRING /RISER DIAGRAM SUPPLIED BY HARDWARE SUPPLIER



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Heading #5 (Group: WR ADO)

Item #5

1 Single door 05, RECEPTION TO BF WR

90° RH

965 x 2440 x 45 - WD DR x HM FR

INSTALL WR SET UP AS FAIL SAFE .

4	Standard Hinge	Ives 5BB1HW 4.5 " x 4 .5 " 652	652
1	Lockset	Schlage ND80P6D RHO 626 MK	626
1	Electric Strike	HES 1500C-630	630
		INSTALL FAIL SAFE	
1	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 PULL SIDE 628 NO ALTERNATE NO ALTERNATE	628
2	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D MTD BOTH SIDES	US32D
1	Wall Door Stop	Ives WS401/402CVX	626
1	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
1	Accessory	Camden CX-WC13AXFM-PS	
1	Accessory	Camden EMERG WR KIT CX-WEC10K2	
1	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	
1	Miscellaneous Hardware	Schlage CON-6W	
1	Miscellaneous Hardware	Camden CX-PS13V3	
1	Miscellaneous Hardware	Camden CX-TRX-4024	
1	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

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Heading #6 (Group: CLASS RM ADO)

Item #6

1 Single door 08, RECEPTION TO INTERVIEW RM

90° RH

965 x 2440 x 45 - WD DR x HM FR

4	Standard Hinge	Ives 5BB1HW 4.5 " x 4 .5 " 652	652
1	Lockset	Schlage ND70 P6 RHO 626 MK	626
1	Electric Strike	Von Duprin 6400- Shim-630	630
1	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 PULL SIDE 628 NO ALTERNATE	628
1	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
2	Accessory	Camden CM-60/4	
2	Accessory	Camden CM-89S	
1	Miscellaneous Hardware	Camden CX-12PLUS	
1	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

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Heading #7 (Group: CLASS RM ADO CR)

Item #7	1 Single door 09, RECEPTION TO CORR	90° RH
Item #8	1 Single door 11, CORR TO VACCINE	90° LH

965 x 2440 x 45 - WD DR x HM FR

8	Standard Hinge	Ives 5BB1HW 4.5 " x 4 .5 " 652	652
2	Lockset	Schlage ND70 P6 RHO 626 MK	626
2	Electric Strike	Von Duprin 6400- Shim-630	630
2	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 PULL SIDE 628 NO ALTERNATE	628
2	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
2	Floor Door Stop	Ives FS439 US26D	US26D
2	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
4	Accessory	Camden CM-60/4	
4	Accessory	Camden CM-89S	
2	Accessory	Camden CX-33	
2	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	
2	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

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Heading #8 (Group: PASSAGE CL)

Item #9	1 Single door 10, CORR TO ADMIN	90° RH
---------	---------------------------------	--------

965 x 2440 x 45 - WD DR x HM FR

4	Standard Hinge	Ives 5BB1 4.5 x 4 " 652	652
1	Latchset	Schlage ND10S RHO	626
1	Surface Closer	LCN 4040XP EDA 689	689
1	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
1	Floor Door Stop	Ives FS439 US26D	US26D



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Heading #9 (Group: CLASS RM CL CR)

Item #10

1 Single door 12, CORR TO INTERVIEW

90° RH

965 x 2440 x 45 - WD DR x HM FR

CARD READER ON INSIDE OF ROOM.

4	Standard Hinge	Ives 5BB1 4.5 x 4 " 652	652
1	Lockset	Schlage ND70 P6 RHO 626 MK	626
1	Electric Strike	Von Duprin 6400- Shim-630	630
1	Surface Closer	LCN 4040XP EDA 689	689
1	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	



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Heading #10 (Group: PASSAGE ADO)

Item #11 1 Single door 13, WORKSPACE TO MEET 90° RH

965 x 2440 x 45 - WD DR x HM FR

4	Standard Hinge	Ives 5BB1 4.5 x 4 " 652	652
1	Latchset	Schlage ND10S RHO	626
1	Electric Strike	Von Duprin 6400- Shim-630	630
1	Electronic Closer	GYRO-TECH AUTO OPERATOR 8710 PULL SIDE 628 NO ALTERNATE	628
1	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Accessory	Camden CM-160/22 INSTALL ADO HEADER	
2	Accessory	Camden CM-60/4	
2	Accessory	Camden CM-89S	
1	Miscellaneous Hardware	Camden CX-12PLUS	
1	Miscellaneous Hardware	MISC WIRING / RISER DIAGRAM	

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Heading #11 (Group: WR)

Item #12 1 Single door 15, WORKSPACE TO WR 90° LH

965 x 2440 x 45 - WD DR x HM FR

4	Standard Hinge	Ives 5BB1 4.5 x 4 " 652	652
1	Lockset	Schlage L9456 P6 06 630 LH OS-OCC MK	630
1	Surface Closer	LCN 1461 689 - REG MTD 45	689
2	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
		MTD BOTH SIDES	
1	Wall Door Stop	Ives WS401/402CVX	626



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Heading #12 (Group: STORE RM CL CR)

Item #13 1 Single door 16, WORKSPACE TO ELEC 90° LH

965 x 2440 x 45 - WD DR x HM FR

4	Standard Hinge	Ives 5BB1 4.5 x 4 " 652	652
1	Lockset	Schlage ND80P6D RHO 626 MK	626
1	Electric Strike	Von Duprin 6400- Shim-630	630
1	Surface Closer	LCN 4040XP REG AL	AL
1	Kick Plate	CBH CBH 903 200 X 40MM LDW C32D	US32D
1	Floor Door Stop	Ives FS439 US26D	US26D
1	Miscellaneous Hardware	UNK CARD READER BY SECURITY CONTRACTOR	



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DOOR CONTROL RELAYS

DOOR CONTROL

CX-33: ADVANCED LOGIC RELAY

CX-33 is a 'state of the art' door controller designed for 'universal' operation in virtually any automatic door application. This compact unit is small enough to fit inside most door operator cases. It provides a large 3 segment LED and simple push buttons for the easiest programming, and supports illuminated signage in restroom applications. It also leads the market with a range of exclusive operating features, including time duration in airlock applications and protection of automatic door operators when utilizing magnetic locks.

Features

- 15 operating modes with sub-modes
- Easily sequence multiple inputs with multiple maintain and hold outputs
- New V3.2 Features Include:
 - Lock Down Mode
 - Delayed Relay Activation
 - Selectable N.O or N.C. Inputs
- Large 3 segment (blue) LED display
- Outstanding power filtering and surge protection
- Selectable time delays with delay on input activation
- Larger terminal strips
- 12V to 24V AC/DC
- 3 year warranty

MODEL

CX-33	Advanced Logic Relay
-------	----------------------



Specifications

Voltage:	12V to 24V AC/DC
Current Draw:	105mA Typical, 320mA Max
Response Time:	0.5 Seconds
Display:	Blue Multi-Segment LED
Input:	4 x Dry 1 x Wet: min. 5V AC/DC N/O or N/C Selectable
Output:	3 x Form C (SPDT)
Contact Rating:	3A @ 30 VDC
Temp Range:	-22°F to +185°F (-30°C to +85°C)
Time Delay:	Hold 1 timer: 0-50 Seconds Delay 1 Timer: 0-15 Seconds Hold 2 timer: 0-50 Seconds Delay 2 timer: 0-60 Seconds Hold 3 Timer: 0-50 Seconds Delay on Activate: 0-10 Seconds
Dimensions:	2"H x 6"W x 7/8"D (51mm x 152mm x 22mm)

CX-33PS: ADVANCED LOGIC RELAY, POWER SUPPLY AND CABINET

The industry leading CX-33 Advanced Logic Relay is available in a metal cabinet that centralizes all door control system components; a 12/24 VDC power supply module, and color coded termination blocks for quick and easy installation.

Features

- Rugged and compact metal cabinet
- Pre-wired with large terminal block for easy access
- Removable door with option for cabinet lock
- Five convenient conduit knockouts; one per side
- 12/24V DC power supply, 2 Amp. (UL listed)
- Available as part of Camden Restroom Control Kits (See pages 34-37).
- Short circuit and thermal overload protection
- 3 year warranty

MODEL

CX-33PS	Advanced Logic Relay, 2 Amp, Power Supply Cabinet and Transformer
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Option

'L'	Add suffix 'L' to model number for Cabinet Lock
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Specifications

Voltage:	16V to 28V AC/DC
Output:	12V or 24 VDC
Current:	2 Amps
Temp Range:	32°F to +120°F (0°C to +49°C)
Dimensions:	11-1/16" H x 7-7/8"W x 2-13/16"D 281mm x 200mm x 72mm)

RESTROOM CONTROL KITS



DOOR CONTROL

CX-WC: BARRIER FREE RESTROOM CONTROL KITS

MODELS	
CX-WC17	COLUMN™ SWITCH RESTROOM SYSTEM KIT (2) CM-7536/4 'Push to Open' Switches (1) CM-7536/8B 'Push to Lock' (Red) Switch (2) CM-AF503 LED Annunciators (with 'Occupied' and 'Locked' Message Labels) (1) CX-33 Controller (1) CX-MDA Surface Magnetic Contacts Add suffix 'F' for French and 'FE' for bilingual
CX-WC17VR-PS	COLUMN™ SWITCH RESTROOM SYSTEM KIT WITH POWER SUPPLY & HANDS-FREE SENSORS (2) CM-7536VR/4 'Push to Open' Column™ Switches and Signs (1) CM-7536VR/8B 'Push to Lock' (Red) Column™ Switch and Sign (1) CX-33PS Controller and Power Supply Cabinet (1) CX-ED2079 Grade 2 Electric Strike (1) CX-MDA Surface Magnetic Contacts Add suffix 'F' for French and 'FE' for bilingual



CX-WC17



CX-WC17VR-PS

CX-WEC SERIES: EMERGENCY CALL SYSTEMS FOR UNIVERSAL RESTROOMS

CX-WEC Series are equipment packages designed to meet the latest building code requirements for universal restrooms. Emergency Call Systems may be installed in restrooms without an automatic door operator, or with Camden CX-WC Series barrier-free restroom kits (with operator).



Listed Components



Compliant

Specifications

Current Draw: CX-WEC Series: 165mA

MODELS	
CX-WEC10	UNIVERSAL EMERGENCY CALL KIT (1) CM-450R/12 Mushroom Push button, single gang, stainless steel faceplate, push/pull, 'PRESS FOR EMERGENCY ASSISTANCE' (1) CM-AF501SO Single gang LED annunciator with adjustable sounder 'ASSISTANCE REQUESTED' (1) CM-AF141SO Single Gang LED Dome Light with sounder (1) CM-SE21A English, solid white sign, 'IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE'; For use without automatic door operator, or with CX-WC 10, 11, 12, 13 & 14 barrier-free restroom control kit. Add suffix 'F' for French and 'FE' for bilingual
CX-WEC10K2	UNIVERSAL EMERGENCY CALL SYSTEM KIT, WITH WHITE DOME LIGHT (1) CM-AF540SO Double gang, push/pull mushroom push button, red, 'Assistance Required', with LED annunciator & adjustable sounder, 'Assistance Requested' (1) CM-AF141SO Single Gang LED Dome Light with sounder (1) CM-SE21A English, solid white sign, 'IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE' Add suffix 'F' for French and 'FE' for bilingual



CX-WEC10



CX-WEC10K2

WWW.CAMDENCONTROLS.COM

ALL-ACTIVE SWITCHES



DOOR ACTIVATION DEVICES



CM-40, CM-41 & CM-60 SERIES: ROUND PUSH PLATE SWITCHES

CM-40, CM-41 and CM-60 Series 'All-Active' push plate switches are heavy-duty, ADA-compliant door controls. Faceplates are stainless steel or solid brass, and the assembly is designed for easy installation. The CM-41 4-1/2" square stainless steel backplate is large enough to cover a poorly installed electrical box. Also fits Camden 4-1/2" square surface boxes.

Features

- Durable stainless steel or brass construction
- 4 stud switch design and rubber dampers for quieter operation
- All-Active design requires minimal actuation force
- Weather resistant boot included
- Large variety of graphics options
- Available in a range of architectural finishes
- 3 year 'Camden Tough' warranty with '2 for 1' replacement

ROUND SWITCHES

CM-40	4-1/2" Round push plate switch, brushed stainless steel finish
CM-41	4-1/2" Round push plate switch, with square back plate, brushed stainless steel finish
CM-60	6" Round push plate switch, brushed stainless steel finish

NO-BATTERY KINETIC BY CAMDEN™ WIRELESS ROUND SWITCHES with built-in transmitter. Receiver required.

CM-40K	4-1/2" Round push plate switch, brushed stainless steel finish
CM-41K	4-1/2" Round push plate switch, with square back plate, brushed stainless steel finish
CM-60K	6" Round push plate switch, brushed stainless steel finish



Listed Components



Compliant



CM-40/2



CM-41/3



CM-60/4

Specifications

Voltage:	12/24V AC/DC
Contact Rating:	15A @ 30 VDC
Contact Type:	SPDT Form 'C'
Mounting:	CM-40/41: Single Gang CM-60: Single/Double Gang or 4 x 4
Switch Type:	Momentary
Std. Finish:	US32 / 630
Dimensions:	CM-40: 4-1/2" Diameter x 1-3/4"D (114mm x 44mm) CM-41: 4-1/2"H x 4-1/2"W x 1-3/4"D (114mm x 114mm x 44mm) CM-60: 6" Diameter x 1-1/8"D (152mm x 28.6mm)

OPTIONS (Add suffix to model above)

Faceplate Graphic Options



CM-xx/1



CM-xx/2



CM-xx/A2



CM-xx/2AL



CM-xx/2AR



CM-xx/3



CM-xx/3F



CM-xx/4



CM-xx/A4



CM-xx/4AL



CM-xx/4AR



CM-xx/4F



CM-xx/8



CM-xx/8B



CM-xx/8F



CM-xx/8D

Architectural Finishes

CM-xxx-AB	Antique Brass
CM-xxx-SB	Satin Brass

CM-xxx-OB	Oil Rub Bronze
CM-xxx-PB	Polished Brass

Water Tight Option

CM-xxx-WT
Boot & watertight coating

Contact Option

CM-xxx-DP
DPDT switch instead of SPDT

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ENCLOSURES AND MOUNTING BOXES

DOOR ACTIVATION DEVICES

CM-49, 79, 59S AND 89S: SURFACE AND FLUSH MOUNT ESCUTCHEONS (FOR ROUND PUSH PLATE SWITCHES)

Camden offers a range of **flame and vandal resistant** low profile escutcheons for mounting 4-1/2" and 6" round push plate switches. ABS escutcheons feature a patented 2-piece design and may be ordered as complete 'kits' or individual parts. Stainless steel escutcheons feature one piece heavy gauge construction.

Features

- Exclusive 2 piece ABS escutcheons can be surface mounted or mounted on in-wall single gang, double gang or 4" square electrical boxes
- Heavy gauge stainless steel escutcheons provide an attractive, rugged look
- ABS models are designed for use with Lazerpoint RF™ 915 Mhz. wireless wall switch transmitters

FOR 4-1/2" ROUND SWITCH - STAINLESS STEEL ESCUTCHEON

CM-59S Surface, Round, Standard Depth. Heavy gauge stainless steel, 7-3/4" x 1-1/18"D

FOR 4-1/2" ROUND SWITCH - ABS SPACESHIP ESCUTCHEON

CM-49 Surface/Flush Mount Kit, includes **CM-49A, CM-49B, CM-49C & CM-49G**, 8-3/4" x 2"D

CM-49A Flush enclosure only (fits single gang box), 7" x 13/16"D

CM-49AK Flush Mount Kit, includes **CM-49A, CM-49C & CM-49G**, (fits single, double and 4 x 4 boxes), 7" x 13/16"D

CM-49B Surface mount enclosure only (must be used with **CM-49A**), 8-3/4" x 1"D

CM-49C Adapter plate for mounting on double gang or 4" Square box, 4" x 1/16"D

CM-49G Gasket for **CM-49A** OR **CM-49B**, 6-1/4" x 1/8"D

FOR 6" ROUND SWITCH - STAINLESS STEEL ESCUTCHEON

CM-89S Surface, round standard depth. Heavy gauge stainless steel, 9-5/8" x 1-1/2"D

FOR 6" ROUND SWITCH - ABS SPACESHIP ESCUTCHEON

CM-79 Surface/Flush Mount Kit, includes **CM-79A, CM-79B, CM-49C & CM-79G**, 9-5/8" x 2"D

CM-79A Flush enclosure only (fits single gang box), 8" x 3/4"D

CM-79AK Flush Mount Kit, includes **CM-79A, CM-49C & CM-79G**, (fits single, double and 4 x 4 boxes), 8" x 3/4"D

CM-79B Surface mount enclosure only (must be used with **CM-79A**), 9-5/8" x 1-1/8"D

CM-79G Gasket for **CM-79A** or **CM-79B**, 7-1/4" x 1/8"D



CM-59S



CM-49A CM-49B
(Shown with TX-9 Transmitter)



CM-89S



CM-79A CM-79B
(Shown with TX-9 Transmitter)



AUTOMATIC DOOR CONTROL SWITCHES

DOOR ACTIVATION DEVICES

CM-160 / 170 / 180 SERIES: KEY SWITCHES

Key switches for automatic doors are designed for mounting on the door operator cabinet or door frame, and are available in a range of 2 or 3 position momentary or maintained models. The key cylinder and 2 keys are included.

Features

- Black lamacoid (plastic) or stainless steel faceplates
- Key removable in all maintained positions
- 2, 3, 4 position maintained and 2 position momentary models
- All switches are keyed alike

MODELS

CM-160	Key switch with plastic lamacoid (mini) faceplate
CM-170	Key switch with stainless steel (narrow stile) faceplate
CM-180	Key switch with stainless steel (single gang) faceplate

OPTIONS (Add suffix to model above)

Faceplate Graphics

MOMENTARY	MAINTAINED	MAINTAINED	MAINTAINED	MAINTAINED
CX-xx/20	CX-xx/21	CX-xx/22	CX-xx/23	CX-xx/24

Extra Keys

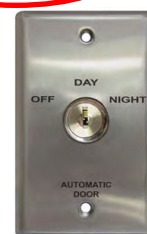
CM-A126	(2) Extra keys for CM-160, 170 and 180 series key switches
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CM-160/23



CM-170/21



CM-180/23

Specifications

Voltage:	12/24 VDC
Contact Rating:	4A @ 28 VDC
Switch Life:	100,000 cycles
Dimensions:	CM-160: 3" H x 1-11/16" W x 1-3/8" D (76mm x 42mm x 35mm) CM-170: 4-1/2" H x 1-3/4" W x 1-3/8" D (114mm x 44mm x 35mm) CM-180: 4-1/2" H x 2-3/4" W x 1-3/8" D (114mm x 70mm x 35mm)

CM-190 SERIES: TOGGLE SWITCH

CM-190 Series maintained toggle switches are designed to control automatic door operators, featuring a choice of faceplates, for mounting on the operator cabinet/wall.

Features

- Mini metal faceplate designed to install on door operator cabinet or door frame
- 2 or 3 position maintained operation
- Single gang faceplate for mounting on standard electrical box
- Heavy duty 6 Amp. contacts

MODELS

CM-190	Mini aluminum faceplate
CM-195	Single gang stainless steel faceplate

OPTIONS (Add suffix to model above)

Faceplate Graphics

	CX-xx/30		CX-xx/31
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CM-190/30



CM-195/31

Specifications

Voltage:	12/24 VDC
Contact Rating:	6A @ 30 VDC
Switch Life:	50,000 cycles
Temp Range:	-4°F - 185°F (-20°C - 85°C)
Dimensions:	CM-190: 2-5/8" H x 1-1/2" W x 2" D (59mm x 38mm x 51mm) CM-195: 4-1/2" H x 2-3/4" W x 2" D (114mm x 70mm x 51mm)



DOOR CONTROL RELAYS

DOOR CONTROL

CX-IRB: ISOLATION RELAY

CX-IRB Isolation Relay Module provides a compact and economical solution for isolating devices from electrical noise and induced voltages, or take (1) input and provide (2) form 'C' outputs. This door control relay is designed to provide the best performance and value in the industry.

Features

- Ultra compact design fits anywhere, including automatic door operators or Power supply cabinets
- Selectable 12/24V DC
- Low power consumption
- Heavy duty double pole, double throw (DPDT) 8 Amp relay contacts
- LED provides relay activation status
- Includes thick double sided tape for easy installation
- 3 year warranty

MODELS

CX-IRB	CX-IRB Isolation Relay Module, 12/24 VDC
CX-IRB-6	Isolation Relay Module, Package of 6, 12/24 VDC



Specifications

Voltage:	12/24 VDC
Current Draw:	240mA @ 12/24 VDC
Contact Rating:	8A @ 30 VDC
Contact Type:	DPDT
Status:	Red LED (Activated when on)
Temperature:	-40°F to 158°F (-40°C to 70°C)
Dimensions:	2-3/4" H x 1-1/2" W x 3/4" D (70mm x 38mm x 20mm)

CX-12 PLUS: DOOR INTERFACE RELAY

CX-12 PLUS Door Interface Relay is an economical solution for interconnecting automatic doors with access control, fire alarm and time systems. It controls two automatic doors in vestibule applications as well as control of automatic doors in basic restroom control applications.

Features

- Designed for easy interconnection of automatic doors with access control, time control, telephone entry and fire alarm systems
- Bi-directional sequencing of two door operators in vestibule applications
- New 'PLUS' feature supports basic restroom control (locked & unlocked)
- 8 Programming modes with (3) adjustable time delays, each up to 30 seconds
- (2) Dry, (2) Wet inputs, and (2) SPDT form 'C' outputs
- Momentary, maintained and latching (ratchet or alternative action) relay operation
- Compact design fits anywhere

MODEL

CX-12PLUS	Door Interface Relay
-----------	----------------------



Specifications

Voltage:	12/24V AC/DC
Current Draw:	20mA Idle, 60 mA Operating
Response Time:	0.3 Seconds
Input:	2 Wet + 2 Dry, N/O
Output:	2 x Form 'C' (SPDT)
Contact Rating:	3A @ 30 VDC
Electrical Life:	100,000 Operations @ Rated Capacity
Modes:	8
Time Delay:	D.O.R. #1: 1-30 Seconds D.O.O. #2: 1-15 Seconds D.O.R. #3: 1-30 Seconds
Dimensions:	2-5/16"H x 3-1/4"W x 11/16"D (58mm x 83mm x 18mm)



RESTROOM CONTROL KITS

DOOR CONTROL

CX-WC: BARRIER FREE RESTROOM CONTROL KITS

MODELS	
CX-WC13AXSM-PS	SURFACE MOUNT COMBO ILLUMINATED PUSH PLATE SYSTEM (1) CX-33PS Advanced Logic Relay, 2 Amp Power Supply, Cabinet and Transformer (1) CM-2520/4854SE1 Combo switch, 2" x 4" narrow 'PUSH TO OPEN' & 'PUSH TO LOCK', Surface mount AURA™ illuminated enclosure and sign (1) CM-45/454SE1 4-1/2" Push plate switch, wheelchair & 'PUSH TO OPEN' with Surface mount AURA™ illuminated enclosure and sign (1) CX-ED2079 Grade 2 ANSI electric strike with 3 faceplates (1) CX-MDA Magnetic contact, surface, SPST, white Add suffix 'F' for French, 'FE' for bilingual, 'SP' for Spanish
	FLUSH MOUNT COMBO ILLUMINATED PUSH PLATE SYSTEM (1) CX-33PS Advanced Logic Relay, 2 Amp Power Supply, Cabinet and Transformer (1) CM-2520/4855SE1 Combo switch, 2" x 4" narrow 'PUSH TO OPEN' & 'PUSH TO LOCK', Flush mount AURA™ illuminated enclosure and sign (1) CM-45/455SE1 4-1/2" Push plate switch, wheelchair & 'PUSH TO OPEN' with Flush mount AURA™ illuminated enclosure and sign (1) CX-ED2079 Grade 2 ANSI electric strike with 3 faceplates (1) CX-MDA Magnetic contact, surface, SPST, white Add suffix 'F' for French, 'FE' for bilingual, 'SP' for Spanish
CX-WC14AXSM	SURFACE MOUNT TWO DOOR RESTROOM SYSTEM (1) CX-EMF2 Multi-Function Relay Controller (2) CM-2520/4854SE1 Combo switch, 2" x 4" narrow 'PUSH TO OPEN' & 'PUSH TO LOCK', Surface mount AURA™ illuminated enclosure and sign (2) CM-45/454SE1 4-1/2" Push plate switch, wheelchair & 'PUSH TO OPEN' with Surface mount AURA™ illuminated enclosure and signs (2) CX-MDA Magnetic contact, surface, SPST, white Add suffix 'F' for French, 'FE' for bilingual, 'SP' for Spanish
	FLUSH MOUNT TWO DOOR RESTROOM SYSTEM (1) CX-EMF2 Multi-Function Relay Controller (2) CM-2520/4855SE1 Combo switch, 2" x 4" narrow 'PUSH TO OPEN' & 'PUSH TO LOCK', Flush mount AURA™ illuminated enclosure and sign (2) CM-45/455SE1 4-1/2" Push plate switch, wheelchair & 'PUSH TO OPEN' with Flush mount AURA™ illuminated enclosure and signs (2) CX-MDA Magnetic contact, surface, SPST, white Add suffix 'F' for French, 'FE' for bilingual, 'SP' for Spanish
CX-WC14AXFM	SURFACE MOUNT TWO DOOR RESTROOM SYSTEM (1) CX-EMF2 Multi-Function Relay Controller (2) CM-2520/4854SE1 Combo switch, 2" x 4" narrow 'PUSH TO OPEN' & 'PUSH TO LOCK', Surface mount AURA™ illuminated enclosure and sign (2) CM-45/454SE1 4-1/2" Push plate switch, wheelchair & 'PUSH TO OPEN' with Surface mount AURA™ illuminated enclosure and signs (2) CX-MDA Magnetic contact, surface, SPST, white Add suffix 'F' for French, 'FE' for bilingual, 'SP' for Spanish
	FLUSH MOUNT TWO DOOR RESTROOM SYSTEM (1) CX-EMF2 Multi-Function Relay Controller (2) CM-2520/4855SE1 Combo switch, 2" x 4" narrow 'PUSH TO OPEN' & 'PUSH TO LOCK', Flush mount AURA™ illuminated enclosure and sign (2) CM-45/455SE1 4-1/2" Push plate switch, wheelchair & 'PUSH TO OPEN' with Flush mount AURA™ illuminated enclosure and signs (2) CX-MDA Magnetic contact, surface, SPST, white Add suffix 'F' for French, 'FE' for bilingual, 'SP' for Spanish



CX-WC13AXSM-PS



CX-WC13AXFM-PS



CX-WC14AXSM



CX-WC14AXFM



CX-PS13 V3: VARIABLE OUTPUT LINEAR POWER SUPPLY

The low cost CX-PS13 linear power supply is designed to provide regulated low voltage power for electrified locks, MProx™ card access systems, washroom control packages and other electronic devices. A 120 VAC transformer with a 6 to 26 VAC output is required. Recommended for use with electric strikes.



Features

- Low cost linear power supply
- Compact board-only design
- Input voltage: 6 - 26 VAC, depending on output voltage selected
- Self-resetting smart fuse protection
- Input voltage transformer required. See manual for specification
- 3 year warranty

MODEL

CX-PS13V3	Variable Output Linear Power Supply
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Specifications

Voltage:	6-26 VAC
Output Voltage:	6, 12, 24 VDC Selectable or 2-24 VDC if ADJ is selected
Output Protection:	PPTC Resettable Fuse
Output Power:	800mA, 200mA Charging Current
Ripple:	<40mV
Efficiency:	12 VDC = 85%, 24 VDC = 90%
Dimensions:	2-3/4"H x 1-1/2"W x 1-3/4"D (69mm x 38mm x 46mm)

TRANSFORMERS



TRANSFORMERS AND RECTIFIERS

Camden offers a range of 12 VAC to 24 VAC standard, plug-in and panel (nipple) mount transformers to support any low voltage system application. The CX-5024 rectifier is used to convert AC power for use with DC powered devices.



Features

- AC and DC models
- Standard and panel mount models
- Fused model for additional circuit protection

MODELS

Panel (Nipple) Mount

CX-TRN-2024* ^o	24 VAC, 20VA panel (nipple) mount transformer
---------------------------	---

Standard Mount

CX-TRX-2012* ^o	12 VAC, 20VA standard mount transformer
CX-TRX-4024* ^o	24 VAC, 40VA standard mount transformer
CX-TRX-5024* ^o [^]	24 VAC, 50VA standard mount transformer

Fused Standard Mount

CX-TRX-2024* ^o	24 VAC, 20VA, fused, standard mount transformer
---------------------------	---

Rectifier

CX-5024	Rectifier (AC/DC) 50 VA
CX-TRK-2450	24 VAC, 40VA standard mount transformer and AC to DC Rectifier

Specifications

Input Voltage:	120 VAC 60 MHz.
Output Voltage:	12 / 24 VAC
Dimensions:	
CX-TRN-2024:	2"H x 2-3/8"W x 2-1/4"D (51mm x 60mm x 57mm)
CX-TRX-2012:	3"H x 2"W x 2-1/8"D (76mm x 51mm x 54mm)
CX-TRX-4024:	2"H x 2-3/8"W x 2-1/2"D (51mm x 60mm x 64mm)
CX-TRX-5024:	2-1/8"H x 3-1/8"W x 2-5/16"D (54mm x 80mm x 60mm)
CX-TRX-2024:	2"H x 2-3/8"W x 2-1/2"D (51mm x 60mm x 64mm)
CX-5024:	1"H x 3/4"W x 1/4"D (25mm x 19mm x 6mm)

WWW.CAMDENCONTROLS.COM



CX-TRN-2024



CX-TRX-2012



CX-TRX-5024



CX-5024

71 Sheffield Street
Toronto, Ontario
M6M 3E9
Canada
Tel: 416-243-1166
Fax: 416-243-3352
Email: info@cbhmfmg.com
Web: www.cbhmfmg.com

All dimensions are in inches.
Product specifications are subject
to change. For the most updated
product features, contact our
customer service department.

©2022 Canadian Builders
Hardware MFG Inc.

CBH 900/901/902/903

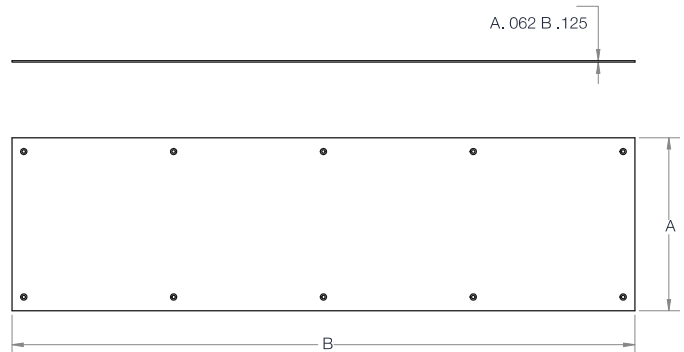
MATERIAL: ALUMINUM, BRASS,
BRONZE AND STAINLESS STEEL

FINISHES: ALL STANDARD

SKUS:
CBH 900-ALUMINUM KICKPLATE
CBH 901-BRASS KICKPLATE
CBH 902-BRONZE KICKPLATE
CBH 903-STAINLESS STEEL KICKPLATE

.050 GAUGE PLATES WILL BE SUPPLIED STANDARD.
FOR THICKER GAUGE PLATES USE SUFFIX

A. 062 B .125



CBH 900-ALUMINUM
CBH 901-BRASS
CBH 902-BRONZE
CBH 903-STAINLESS STEEL

KICKPLATE

All kickplates are drilled, countersunk and
supplied standard with #6 x 5/8 oval head
socket wood screws. Machine screws or tape
fastening is available upon request.

Kickplates available with bevelled edges at extra
cost. All tape Kickplates are bevelled edge.



Quality Craftsmanship Since 1978.

1500 Series®

Electric Strike

Works with all brands of cylindrical and mortise locksets without a deadbolt

Also available in Complete One Box Solution



The most advanced, modular electric strikes that work with every brand of cylindrical or mortise locks designed to work with a 4-7/8" strike plate.

The HES 1500 Series® Electric Strikes set a new standard in the industry by offering dynamic integrated adjustability and field configurable options compatible with any cylindrical or mortise lock. The modular design of the platform makes stocking and installing easier with interchangeable faceplates and accessories. For the first time, the aesthetics of an electric strike are complimentary to other surrounding door hardware and blend in with the opening due to the fully finished design available in eight finishes.

Features

- Stainless steel construction
- Tamper resistant
- Static strength 1500 lbs
- Dynamic strength 70 ft-lbs
- Endurance 1,000,000 cycles
- Field selectable fail safe/fail secure
- Non-handed
- Interchangeable faceplates and accessories
- Field replaceable components
- Fully finished faceplate, keeper, case and trim
- Field adjustable integrated shim
- Strike body depth 1-3/8" [34.9mm]
- SecuriCare five-year, no-fault, no questions asked warranty (Addition of SMART Pac® III extends the warranty to 10 years)

Options

- LM – Lock monitor
- DLM – Dual lock monitors
- LMS – Lock monitor and strike monitor
- DLMS – Dual lock monitors and strike monitor

Accessories

- 157 Torx® screws
- HES-CUT-MTK Metal Template Kit
- OPT-1SRK Spring Replacement kit
- OPT-1LM Single lock monitor
- OPT-1DLM Dual lock monitors
- MOD-1SOL Solenoid Replacement Module



Grade 1



SecuriCare Warranty



Mortise Locks without Deadbolt



Cylindrical Locksets



Field Selectable (Fail secure / Fail safe)



Dual Voltage 12/24



PoE Friendly



Fire Rated



Windstorm Rated



Outdoor Rated



Burglary Rated

hes

ASSA ABLOY

CDH

Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosiatic House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submission Date: April 14/26

Hinges and pivots

Architectural hinges

5BB1

5 Knuckle, ball bearing full mortise hinge

- Recommended for medium weight doors (<150 lbs)
- Recommended for medium frequency usage (<400 cycles per day)
- Made with two ball bearing assemblies
- Recommended for use with a door closer
- Packed with fasteners for hollow metal and wood doors
 - 12-24 x 1/2 UFPHMS, 12 x 1 1/4 FPHWS
 - 10-24 x 1/2 UFPHMS, 10 x 1 FPHWS (3.5x3.5 hinge size only)

Specifications

Material substrate	Made from brass, 1040 steel or 304 series stainless steel
Certifications	▪ Certified to ANSI/BHMA A156.1 for performance standards ▪ Meets ANSI/BHMA 156.7 for template hinge dimensions ▪ UL Classified for windstorm rated assemblies - R37965 ▪ UL10C Listed for steel only (3 hour)

Dimensions

Height x Width	Size (mm)	Gauge
3.5 x 3.5	89 x 89	0.123
4 x 4	102 x 102	0.130
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134
5 x 4.5	127 x 114	0.146
5 x 5	127 x 127	0.146

Refer to General Hinge Information page to determine proper hinge for application

Options

NRP	Non-removable pin	TW4	Four wire
HT	Hospital tip	TW4M*	Four wire with monitor
SH	Security stud - comes standard with NRP	TW8	Eight wire
RC=1/4, RC=5/8	Rounded corners	TW8M*	Eight wire with monitor
SEC	Security fasteners - pin-in-socket (for hollow metal doors and frames only)	TW12	Twelve wire
		MON*	Monitor

*TW and MON options are not available on 4 x 4 or smaller.

Finishes

BHMA	Description	Substrate	Finish
600	Primer Paint	Steel	USP
605	Bright Brass	Brass	US3
606	Satin Brass	Brass	US4
612	Satin Bronze	Brass	US10
613	Oil Rubbed Bronze	Brass	US10B
614	Oxidized Bronze	Brass	US10A
619	Satin Nickel	Brass	US15
622	Matte Black	Brass	B-BLK
625	Bright Chrome	Brass	US26
626	Satin Chrome	Brass	US26D
643e/716	Aged Bronze	Brass	B-643e/716
695	Dark Bronze Painted	Brass	B-695/US10BE
629	Bright Stainless	Stainless steel	US32
630	Satin Stainless	Stainless steel	US32D
631	Matte Black	Steel	F-BLK
632	Bright Brass	Steel	US3
633	Satin Brass	Steel	US4
639	Satin Bronze	Steel	US10
640	Oil Rubbed Bronze	Steel	US10B
641	Oxidized Bronze	Steel	US10A
646	Satin Nickel	Steel	US15
651	Bright Chrome	Steel	US26
652	Satin Chrome	Steel	US26D
643e/716	Aged Bronze	Steel	F-643e/716
695	Dark Bronze Painted	Steel	F-695/US10BE

For other colors, consult factory.



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Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosaic House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submission Date: April 14/26

Hinges and pivots

Architectural hinges

5BB1HW

5 Knuckle, ball bearing, heavy weight full mortise hinge

- Recommended for heavier weight doors (>150 lbs)
- Recommended for high frequency usage (400 cycles per day)
- Made with four ball bearing assemblies
- Recommended for use with a door closer
- Packed with fasteners for hollow metal and wood doors
 - 12-24 x 1/2 UFPHMS, 12 x 1/4 FPHWS

Specifications

Material substrate	Made from brass, 1040 steel or 304 series stainless steel
Certifications	- Certified ANSI/BHMA A156.1 for performance standards - Meets ANSI/BHMA 156.7 for template hinge dimensions - UL Classified for windstorm rated assemblies - R37965 - UL 10C Listed for steel only (3 hour)

Dimensions

Height x Width	Size (mm)	Gauge
4.5 x 4	114 x 102	0.180
4.5 x 4.5	114 x 114	0.180
5 x 4.5	127 x 114	0.190
5 x 5	127 x 127	0.190

Refer to General Hinge Information page to determine proper hinge for application

Options

NRP	Non-removable pin	TW4	Four wire
HT	Hospital tip	TW4M	Four wire with monitor
SH	Security stud - comes standard with NRP	TW8	Eight wire
RC=1/4, RC=3/8	Rounded corners	TW8M	Eight wire with monitor
SEC	Security fasteners - pin-in-socket (for hollow metal doors and frames only)	TW12	Twelve wire
		MON	Monitor

Finishes

BHMA	Description	Substrate	Finish
600	Primer Paint	Steel	USP
605	Bright Brass	Brass	US3
606	Satin Brass	Brass	US4
612	Satin Bronze	Brass	US10
613	Oil Rubbed Bronze	Brass	US10B
614	Oxidized Bronze	Brass	US10A
619	Satin Nickel	Brass	US15
622	Matte Black	Brass	B-BLK
625	Bright Chrome	Brass	US26
626	Satin Chrome	Brass	US26D
643e/716	Aged Bronze	Brass	B-643e/716
629	Bright Stainless	Stainless steel	US32
630	Satin Stainless	Stainless steel	US32D
631	Matte Black	Steel	F-BLK
632	Bright Brass	Steel	US3
633	Satin Brass	Steel	US4
639	Satin Bronze	Steel	US10
640	Oil Rubbed Bronze	Steel	US10B
641	Oxidized Bronze	Steel	US10A
646	Satin Nickel	Steel	US15
651	Bright Chrome	Steel	US26
652	Satin Chrome	Steel	US26D
643e/716	Aged Bronze	Steel	F-643e/716
695	Dark Bronze Painted	Steel	F-695/US10BE

For other colors, consult factory.



Door stops, holders and silencers

Floor stops and holders

FS439

Universal dome floor stop

- High or low-rise mount
- Spring-loaded rubber contact
- Packed with fasteners for light duty masonry and wood applications
- Grey rubber bumper

Specifications

Material substrate	Made from cast zinc or stainless steel
Certifications	Meets ANSI/BHMA A156.16

Dimensions

Overall height	Pad height	Base height	Base diameter
1 1/2"	1 1/8"	1/4"	1 7/8"

Finishes - zinc

BHMA	Description	Substrate	Finish
676	Matte Black	Zinc	BLK
677	Bright Brass	Zinc	US3
678	Satin Brass	Zinc	US4
704	Oil Rubbed Bronze	Zinc	US10B
—	Satin Nickel	Zinc	US15
681	Bright Chrome	Zinc	US26
682	Satin Chrome	Zinc	US26D
—	Aged Bronze	Zinc	643e/716

Finish - stainless steel

BHMA	Description	Substrate	Finish
630	Satin Stainless	Stainless steel	US32D

For other colors, consult factory.



FS410

Decorative floor stop

- Non-directional
- Packed with fasteners for light duty masonry and wood applications.
- Black rubber ring

Specifications

Material substrate	Made from cast brass
Certifications	Meets ANSI/BHMA A156.16

Dimensions

Overall height	Base height	Base diameter
1 1/2"	1/4"	1 1/4"

Finishes - zinc

BHMA	Description	Substrate	Finish
605	Bright Brass	Brass	US3
619	Satin Nickel	Brass	US15
622	Matte Black	Brass	BLK
625	Bright Chrome	Brass	US26
626	Satin Chrome	Brass	US26D
—	Aged Bronze	Brass	643e/716



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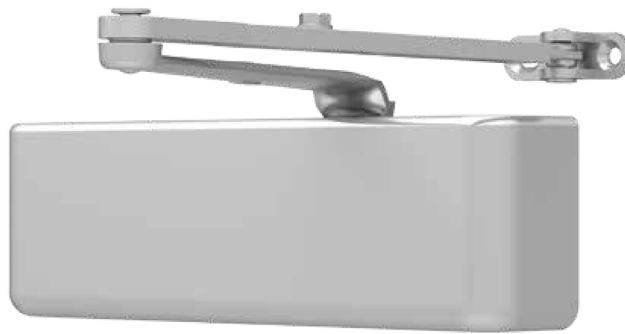
Miscellaneous hardware

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4040XP Series

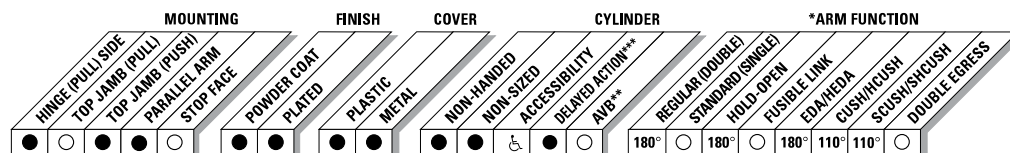
Features

The 4040XP is LCN's most durable and flexible heavy duty closer designed for institutional and other demanding high traffic applications.

Certifications	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 Hour Salt Spray, Meets BAA - Buy American Act	Cover	■ Plastic, Standard ■ Metal, Optional
Body Construction	■ Cast Iron Body ■ Full Complement Bearings ■ 1-1/2" Diameter Piston ■ 3/4" Diameter Double Heat Treated Pinion Journal	Fasteners	Self Reaming and Tapping Screws (SRT)
Fluid	All Weather Liquid X Fluid	Mounting	Hinge (Pull Side), Top Jamb (Push Side), Parallel Arm (Push Side)
Handing	Non-Handed	Arms	Regular Arm
Templating	Peel-n-Stick templates - 2-1/4" x 5" Mounting Hole Pattern	Finishes/Colors/ Powder Coat	■ Aluminum (689) ■ Statuary Bronze (690) ■ Light Bronze (691) ■ Black (693) ■ Dark Bronze (695) ■ Brass (696) ■ Custom colors optional ■ Optional SRI primer - powder coat only ■ Optional plated finishes
Size	Adjustable Spring Size 1-6, includes Patented Green Dial		
Warranty	30 years		

Special Templates

Customized installation templates or products may be available to solve unusual applications. Contact LCN Product Support for assistance.



● AVAILABLE
○ NOT AVAILABLE

♿ Closer available with less than 5.0 lbs. opening force on 36" door.
* Maximum opening/hold-open point with standard template.
** Advanced Variable Backcheck.
*** Delay feature incorporates standard 4040 cylinder (not XP).

LCN Door Control Catalog

phone: 877-671-7011 ■ fax: 800-248-1460 ■ www.allegion.com/us ■ 009426 rev.2/16

LCN

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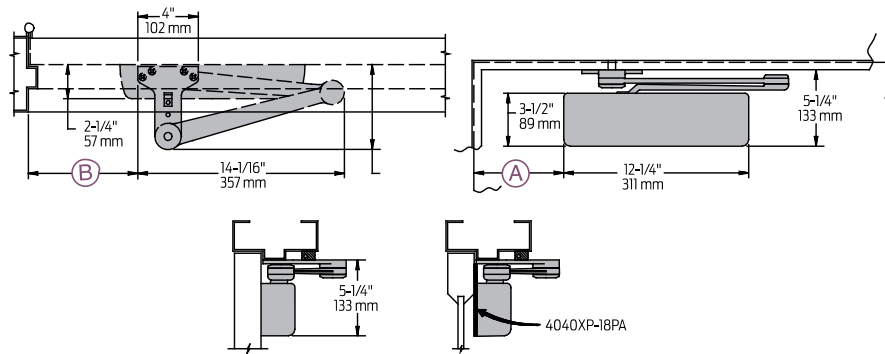
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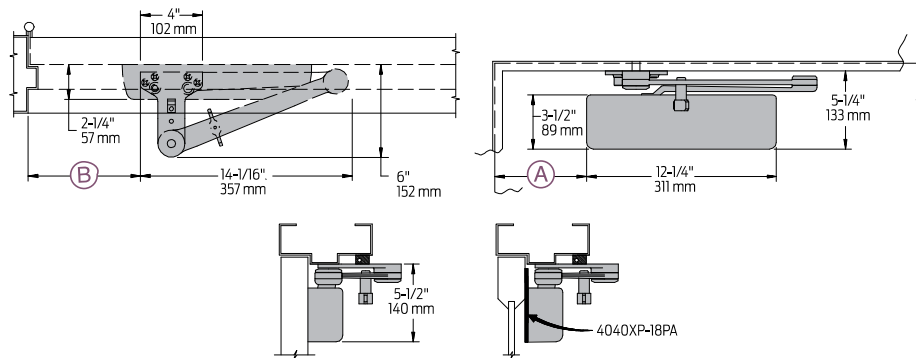
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EDA mount



CUSH mount



Clearance	4040XP-62EDA is 5-1/2" (140 mm) from door face. 6" (152 mm) for CUSH	
Head Frame	Flush or rabbeted requires CUSH FLUSH PANEL ADAPTER, 4040XP-419	
CUSH ARM	Requires SHOE SUPPORT, 4040XP-30 for fifth screw anchorage for narrow frames	
Delayed Action	- Incorporates standard 4041 cylinder, without XP cylinder. - Delays closing from maximum opening to ; 115° with 180° template, 95° with 110° template, 85° with 100° template, 75° with 90° template. Delay time adjustable up to approximately 1 minute.	
Maximum Opening	EDA arm can be templated for points at:	
	110°: A = 6-3/8" (162 mm) B = 7-3/4" (197 mm)	CUSH arms can be templated for opening/hold-open point at:
	or 180°: A = 2-7/8" (73 mm) B = 4-1/4" (108 mm)	85°: A = 7-15/16" (202 mm) B = 9-1/8" (232 mm)
	Hold-open points up to maximum opening with HEDA arm	90°: A = 7-3/16" (183 mm) B = 8-1/2" (216 mm)
		100°: A = 6-1/16" (154 mm) B = 7-1/4" (184 mm)
		or 110°: A = 5-1/16" (129 mm) B = 6-3/8" (162 mm)

Notes:

- 4040XP Series closers ordered with EDA or CUSH arms include 4040XP-201 FIFTH HOLE SPACER to support the shoe
- Spring Cush stop points are approximately 5° more than templated stop point
- Hold open at templated stop points

4040XP Series

Mounting details

EDA and CUSH Mounting

LCN Door Control Catalog

phone: 877-671-7011 ■ fax: 800-248-1460 ■ www.allegion.com/us ■ 009426 rev.2/16

LCN

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Mosaic House Commercial Space Fit up.
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Submission Date: April 14/26

Arms

4040XP Series

Accessories



4040XP-3077
Regular Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal P4041 closer includes PA SHOE, 4040XP-62PA required for parallel arm mounting



4040XP-3077L
Long Arm

- Non-handed
- Includes LONG ROD AND SHOE, 4040XP-79LR for top jamb mount
- Optional



4040XP-3077ELR
Extra Long Arm

- Non-handed
- Includes EXTRA LONG ROD AND SHOE, 4040XP-79ELR for top jamb mount with deep reveal
- Optional



4040XP-3049
Hold-Open Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal, hold-open adjustable shoe
- 4040XP closer includes 4040XP-62PA shoe required for parallel arm mounting
- Optional



4040XP-3049L
Long Hold-Open Arm

- Non-handed
- Includes LONG HEAD AND TUBE, 4040XP-3048L for top jamb mount
- Optional



4040XP-3077EDA
Extra Duty Arm

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional



4040XP-3049EDA
Hold-Open Extra Duty Arm

- Handed
- Parallel arm features forged, solid steel main and forearm for potentially abusive installations
- Hold-open function is adjusted at the shoe
- Optional



4040XP-3077EDA/62G
Extra Duty Arm with 62G

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance
- Optional



4040XP-3049EDA/62G
Hold-Open Extra Duty Arm with 62G

- Handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance. Hold-open function is adjusted at the shoe
- Optional



4040XP-3077CNS
Cush-N-Stop® Arm

- Non-handed
- Features solid forged steel main arm and forearm with stop in soffit shoe.
- Optional



4040XP-3049CNS
HCUSH Arm

- Non-handed
- Hold-open function with templated stop/hold-open points
- Handle controls hold-open function
- Optional



4040XP-3077SCNS
Spring CUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional



4040XP-3049SCNS
Spring HCUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold-open function
- Optional

LCN Door Control Catalog

phone: 877-671-7011 ■ fax: 800-248-1460 ■ www.allegion.com/us ■ 009426 rev.2/16

LCN®

43

CDH

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Oakville, L6H 5V1

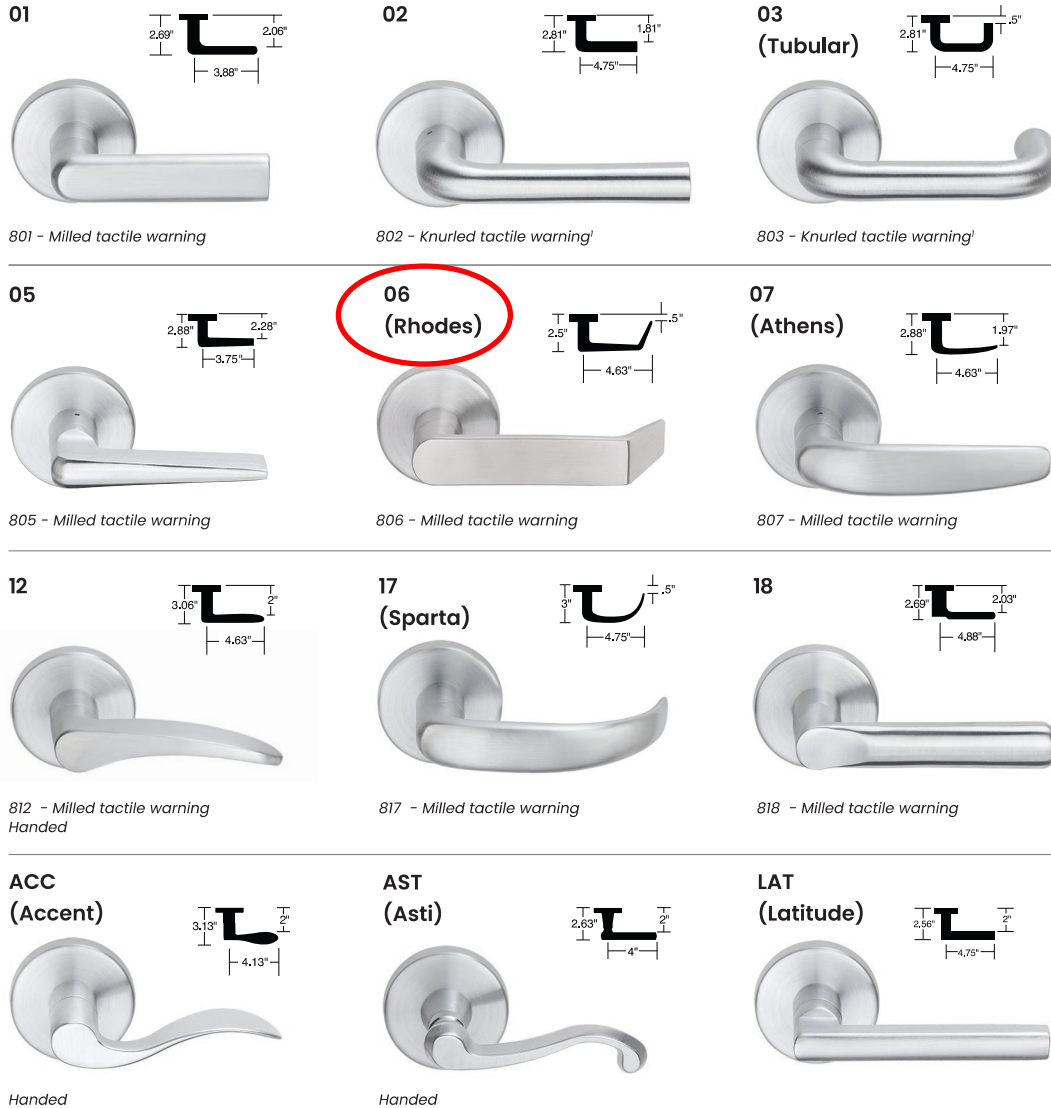
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5676 Main st Whitchurch-Stouffville

Submission Date: April 14/26

Trims & Finishes

The Standard Collection

The Standard Collection levers can be paired with exit devices and locks from our trusted Schlage and Von Duprin brands. And, they are built to the same exacting standards. Our Standard Collection levers offer a more traditional style that is appropriate for use in a number of commercial applications.



1. Knurled tactile warning available on 609, 612, 613, 625, 626, 629, and 630 finishes only.

Trim Options

Know It's Locked.™

Patented, 180-Degree, High-Visibility Lock Status Indicator Trims

Lock status indication is about assuring safety and/or privacy. A classroom door that is visibly locked when seen from any angle, even 30' away can help students and teachers feel confident and secure. In restaurant settings, it can reduce patron time spent away from the table. In health care, it can inform staff of a patient's location when out of bed and give the patient a greater sense of privacy. Whether the need is for privacy on dressing rooms, mother's lactation rooms, or restroom doors or, more importantly, for security—to know it's locked when seconds count, status indication is a valuable feature available on most L Series mortise functions.

MADE TO BE SEEN

Clear messaging that can be seen across the room and from any position in sight of the door means teachers can focus on calming and protecting students in other ways. Schlage has designed indication trim allowing high visibility at a greater distance than other locks.

- Large main viewing windows are 2" x 0.6"
- Maximized message size
- Patented, 180-degree window for visibility from any angle
- High contrast, red and white color is easy-to-read for even the color blind
- Available in 38 functions (33 mechanical and three multi-latch)
- Most functions available as inside, outside, and dual (inside and outside) indication
- Available retrofit kits



Inside Trims



Thumbturn

Key cylinder

Outside Trims



Emergency key

Coin turn

Key cylinder

Available Messages

	LOCKED	OCCUPIED	DO NOT DISTURB	
	UNLOCKED	UNOCCUPIED		
Inside trim	IS-LOC	IS-OCC	IS-DND	IS-SYM
Outside trim	OS-LOC	OS-OCC	OS-DND	OS-SYM



Chevron Indicator

Functions L9486, L9496, and L496 (sectional trim only) use the 09-611 chevron style indicator. Available in these messages: "OCCUPIED", "DO NOT DISTURB" or "LOCKED".

Mechanical Lock Functions

Single Cylinder Deadbolt Functions

Schlage
L/LV9453

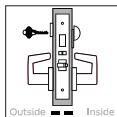
ANSI
F20

Schlage
L/LV9456 with XL13-439

ANSI
F13

Schlage
L9460 with XL11-635

ANSI
-

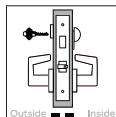


Entrance/office lock with deadbolt

- Key cylinder outside; thumbturn inside; deadbolt, latchbolt and deadlocking auxiliary latch
- Latchbolt retracted by lever (or knob) from either side
- Outside lever is made inoperative when deadbolt is thrown by key outside; rotating thumbturn 20° locks outside lever only; rotating thumbturn 90° also throws deadbolt; Vandgard® option allows outside lever to rotate freely down while locked
- Key outside retracts deadbolt and latchbolt; however, outside lever remains locked
- Rotating inside lever retracts deadbolt and latchbolt; outside lever unlocked when thumbturn is returned to vertical position
- Inside lever always free for immediate egress

Caution: Egress without fully rotating the thumbturn to vertical position can result in lock-out situations.

Note: Hospital latch and ligature-resistant trims not available with Vandgard option.

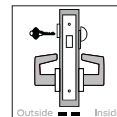


Corridor lock with deadbolt

- Key cylinder outside; thumbturn inside; deadbolt and latchbolt
- Latchbolt retracted by lever (or knob) from either side
- Outside lever is made inoperative when deadbolt is thrown by key outside or by inside thumbturn; Vandgard® option allows outside lever to rotate freely down while locked
- Key outside retracts deadbolt and unlocks outside lever; XL13-439 option allows key to retract deadbolt overriding thumbturn if being held in locked position
- Rotating inside lever retracts both deadbolt and latchbolt and unlocks outside lever
- Inside lever always free for immediate egress

Note: Hospital latch and ligature-resistant trims not available with Vandgard option.

To order with key override, specify function and note XL13-439 as a special option.



Cylinder x thumbturn deadbolt with fixed levers

- Key cylinder outside; thumbturn inside; deadbolt only
- Both levers (or knobs) always fixed
- Deadbolt thrown or retracted by key outside or by inside thumbturn

To order, specify function and note XL11-635 as a special option.

Schlage
L9460 with XL11-886

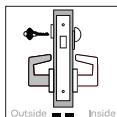
ANSI
-

Schlage
L9464 with XL11-886

ANSI
-

Schlage
L9465

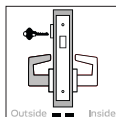
ANSI
-



Cylinder x thumbturn deadbolt with inside active lever

- Key cylinder outside; thumbturn inside; deadbolt only
- Outside lever (or knob) always fixed; inside lever always active
- Deadbolt thrown or retracted by key outside or by inside thumbturn
- Rotating inside lever retracts deadbolt
- Inside lever always free for immediate egress

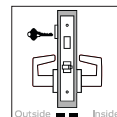
To order, specify function and note XL11-886 as a special option.



Single cylinder deadbolt with inside active lever

- Key cylinder outside with lever (or knob); lever only-inside; deadbolt only
- Outside lever always fixed; inside lever always active
- Deadbolt thrown or retracted by key outside
- Rotating inside lever retracts deadbolt
- Inside lever always free for immediate egress

To order, specify function and note XL11-886 as a special option.



Closet/storeroom lock

- Key cylinder outside with lever (or knob); lever only-inside; deadbolt and latchbolt
- Latchbolt retracted by lever from either side at all times
- Deadbolt thrown or retracted by key outside

Caution: Deadbolt locks with outside key retraction only can result in situations where occupants can be locked in.

Note: Hospital latch and ligature-resistant trims not available with Vandgard option.

Mortise Lock Comparison

ND MECHANICAL



Applications

The ND Series' functional and trim offerings are the most expansive of the Schlage cylindrical lock portfolio. This extremely versatile lock is made to handle the abuses of heavy use in any commercial setting. Options include best-in-class lock status indication ideal for classroom security and ligature-resistant options for the healthcare market.

Because ND uses an ANSI door prep common across cylindrical locks, it is ideal for both new construction and retrofit upgrades.

Key Features

- Significantly exceeds ANSI/ BHMA A156.2 requirements for Grade 1 cylindrical locks
- 25 mechanical functions plus eight that feature Vandlgard® locked lever protection
- Nine lever designs, two rose designs, status indication and ligature-resistant trim options
- Nine standard finishes, plus an antimicrobial coating option
- Supports Conventional, FSIC, and SFIC cylinder formats plus high-security UL 437 options
- Multiple key systems available – open, patented, restricted, and geographically exclusive
- Support for 10 non-Schlage cores (see cylinder section)

1. NDE wireless electronic is not available in 613 finish.

ND WIRED ELECTRIFIED



Applications

Electrified locks complement mechanical ND Series where wired electronic access control solutions are desired. They can be applied as part of a network or independently with a remote access switch such as may be used for a reception area.

Electrified ND locks are ideal for high-traffic areas where line power ensures continuous operation. They are most easily incorporated into new construction where electrified door prep, conduit hinges, and wiring is planned for the building.

Key Features

All mechanical features plus:

- Combines mechanical strength with the convenience of electronic access control
- Auto-detects 12V or 24V DC
- Selectable EL/EU operation
- Four electrified functions
- Low 0.24 amp max current draw allows multiple locks on a single power supply
- Low 0.01 amp holding current eliminates "hot levers" in electrically locked applications
- Modular Request-to-Exit (RX) can be added at any time

NDE WIRELESS ELECTRONIC



Applications

NDE mobile enabled wireless locks are designed to affordably extend electronic access control deeper into the building beyond traditional perimeter and high security openings.

The NDE is ideal for both commercial new construction and retrofit. Facilities can benefit from the enhanced security, efficiency, and convenience of upgrading to electronic credentials.

Key Features

All mechanical features' plus:

- Interior push button with indication for storeroom, office, privacy and apartment functionality
- Compatible with Bluetooth, NFC, smart, or proximity credentials
- Integrated credential reader, door position sensor, and request-to-exit (RX) switch
- Built-in Bluetooth® enables wireless configuration from smart phones/tablets
- Functions in offline or No-Tour mode or as a networked lock with either periodic check-ins or real-time management
- Up to 2 years of battery life

Commercial.Schlage.com | ND Series Cylindrical Locks

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Overview

Key Features

Trims & Finishes

Mechanical

Wired Electrified

Wireless Electronic

Credentials & Key Systems

Ordering & Specifications



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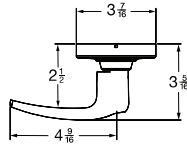
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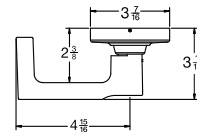
Trims & Finishes

Lever Designs & Finishes

Athens (ATH)

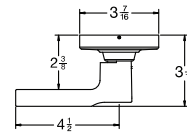


Cores KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-ME, J-SA, J-YA6

Boardwalk (BRK)¹

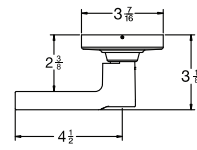
Cores KIL, FSIC, SFIC

Broadway (BRW)

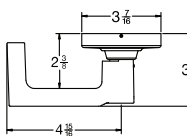


Cores KIL, FSIC, SFIC

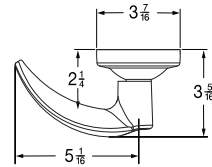
Latitude (LAT)



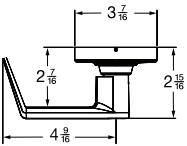
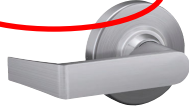
Cores KIL, FSIC, SFIC

Longitude (LON)¹

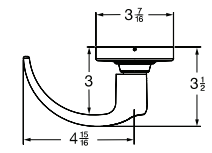
Cores KIL, FSIC, SFIC

Omega (OME)¹

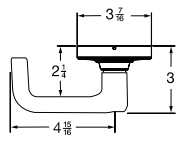
Cores KIL, FSIC, SFIC

Rhodes (RHO)¹

Cores KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-CO7, J-ME, J-SA, J-YA6, J-YA7

Sparta (SPA)¹

Cores KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-ME, J-SA, J-YA6

Tubular (TLR)¹

Cores KIL, FSIC, SFIC, L-CO, L-SA, J-CO6, J-ME, J-SA, J-YA6

Finishes



605
Bright Brass



606
Satin Brass



612
Satin Bronze



613²
Oil Rubbed
Bronze



619
Satin Nickel



622
Matte Black



625
Bright
Chrome



626/626AM
Satin
Chrome/
Antimicrobial



630³
Satin
Stainless
Steel



643e
Aged Bronze

1. Boardwalk, Longitude, Omega, Rhodes, Sparta, and Tubular levers comply with California state code for return within 1/2" of door face.

2. NDE wireless electronic locks not available in 613 finish.
3. Available on HSLR trim only.

ND Series Mechanical Locks

The ND mechanical lock, along with being Schlage's best-selling cylindrical lock, is the foundation for both the wired electrified and NDE wireless electronic lock. Not only did Schlage invent the cylindrical lock, but we continue to make it better with capabilities that go beyond Grade 1. ND Series offers unparalleled strength, exceptional durability, and installation ease. All this is in addition to what you know and expect from Schlage.

It's smarter security you can trust.



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SCHLAGE

ALLEGION

CDH

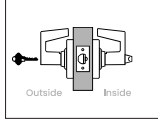
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5676 Main st Whitchurch-Stouffville

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Mechanical Lock Functions

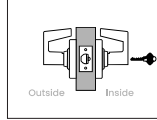
Keyed Functions

Schlage
ND53**Entrance lock**

- Lever with key cylinder outside; push/turn button in lever inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is made inoperative by pushing button or pushing and turning button on inside lever; key outside does not lock
- Pushed button unlocking:** key outside or rotating inside lever retracts latch and releases button unlocking outside lever
- Pushed/turned button unlocking:** key outside or rotating inside lever retracts latch but does not unlock outside lever; rotate inside button to start position to allow button release and unlocking by key or by rotating inside lever
- Inside lever always free for immediate egress

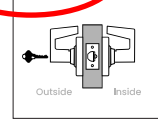
Caution: Egress without fully releasing the push/turn button can result in lock-out situations.

Note: Locks ordered with indicator trim fit 1-3/4" doors. Sold separate spacer kits allow application to doors 1-3/8" to 1-11/16".

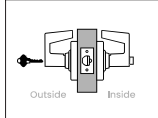
ANSI
F109**Schlage**
ND60 with XN12-001**Vestibule lock with interior unlocking only**

- Lever outside; lever with key cylinder inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is locked or unlocked by key inside
- Inside lever always free for immediate egress

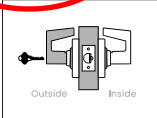
To order, specify function and note XN12-001 as a special option.

ANSI
- Schlage
ND70**Classroom lock, exterior lockdown only**

- Lever with key cylinder outside; lever inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is locked or unlocked by key outside
- Inside lever always free for immediate egress

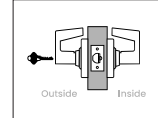
ANSI
F84**Schlage**
ND73**Corridor lock**

- Lever with key cylinder outside; push button in lever inside; deadlatch
- In unlocked state latch is retracted by either lever
- Outside lever is made inoperative by pushing button on inside lever or by key outside
- When locked by pushed button:** rotating inside lever retracts latch and releases button unlocking outside lever; closing door also unlocks preventing lock-out
- When locked by key:** rotating inside lever retracts latch but outside lever remains fixed until unlocked by key outside
- Inside lever always free for immediate egress

ANSI
F90**Schlage**
ND80**Storeroom lock**

- Lever with key cylinder outside; lever inside; deadlatch
- Outside lever always fixed; latch retracted by inside lever
- Key in outside lever retracts latch only
- Inside lever always free for immediate egress

To order configured with Request to Exit (RX), specify RX under special options.

ANSI
F86**Schlage**
ND81**Accessible storeroom lock**

- Lever with key cylinder outside; lever inside; deadlatch
- Outside lever is always fixed when key is not present; latch retracted by inside lever
- Key outside turned counter-clockwise retracts latch; 180-degree clockwise rotation of key allows outside lever to retract latch
- Inside lever always free for immediate egress

To order configured with Request to Exit (RX), specify RX under special options.

ANSI
F86

6300 Series surface mounted strike for rim exit devices

Overview

Von Duprin electric strikes are known for their reliability, durability and security. The 6300 Series is designed to withstand abuse. Its heavy-duty stainless steel construction is fully UL1034 and UL10C Listed.

6300 Series electric strikes are designed for use with a variety of rim devices. It interfaces with the latch mechanism of the exit device. The movable lip (keeper) allows a door to open even when the latch bolt is extended. This feature, called remote release, provides added benefits such as increased convenience and efficiency. The 6300 Series also provides added security and traffic control.

6300 Series electric strikes are ideal for aftermarket applications. It is easy to install without modifying or altering the door frame. To assure the proper selection of an electric strike on new applications, lockset compatibility charts are shown on the next page. When using a lockset not listed or when retrofitting a strike to an existing application, please contact Von Duprin technical support for application assistance.

The 6300 is fail-secure (FSE) only to achieve compliance with UL10C for fire-rated openings. In a fail-secure application, the door is normally locked. To unlock the door, power must be applied. The 6300 strike can be used with either 12VDC or 24VDC. There are 2 connectors that ship with it and the appropriate connector for either 12VDC or 24VDC will be used, based upon the available voltage at the opening.

Features and benefits

- Non-handed design provides greater flexibility
- Requires no alteration or cutting to existing frame
- UL1034 burglary-resistant and
- UL10C electric strike for fire door
- Stainless steel (satin) finish
- Durable stainless steel construction
- Field selectable voltage 12VDC or 24VDC
- Dynamic strength 70 ft-lbs
- Endurance 2,000,000 cycles

6300 Series power requirements

Model	Voltage	Current	Duty	Amps	Ohms
6300	12V	DC	Continuous	0.50	22
6300	24V	DC	Continuous	0.24	89



Rim exit device compatibility 6300 strikes

Manufacturer	Model Number
Von Duprin	VD 22/22-F Rim
Von Duprin	VD 33A/35A Rim*
Von Duprin	VD 55 Rim
Von Duprin	VD 88 Rim
Von Duprin	VD 98/99 and 98/99-F Rim
Falcon	Falcon 24/24-F Rim*
Falcon	Falcon 25/25-F Rim
Falcon	Falcon 19/19-F Rim
Falcon Doromatic	Falcon Doromatic 1590*
Falcon Doromatic	Falcon Doromatic 1790*
Falcon Doromatic	Falcon Doromatic 2090*

* Style and frame condition may affect compatibility.

Model specifications

Model number	6300
Retrofits model	N/A
Latchbolt throw	3/4"
Face plate length	9"
Projection	3/4"
Lockset	Rim exit device
Number of doors	Single or pair with mullion
Door/frame type	Hollow metal, aluminum and wood
EB (entry buzzer)	Optional
Certifications	UL1034, UL10C, UL 294, CSFM
Application notes	Surface mounted electric strike ideal for aftermarket applications. Strike designed for use with Von Duprin 98/99, however it can be used with most rim exit devices.

6300 Series surface mounted strike for rim exit devices

Von Duprin Door control and security hardware • 17



Commercial Doors & Hardware Ltd.
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5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

6400 Series modular strike for mortise and cylindrical locksets

Overview

The 6400 electric door strike from Von Duprin is designed to be modular and highly configurable to fit nearly any mortise or cylindrical lock. This versatile strike allows the installer to insert and lock-in the deadbolt keeper or plug and deadlatch ramp anywhere within its 3 1/8" vertical opening to fit the latch position and functional needs. This, combined with a 1/8" horizontal adjustment, makes this easy-to-install design a good fit for installations where misalignment or a tight fit may be a problem.

As a 3-hour UL 10C listed strike, the 6400 Series is intended as a fail-secure only solution for fire-rated openings. Its durability and quality are shown by its grade 1 certification as a heavy-duty stainless steel strike with over 2,000,000 endurance cycles.

Use it as a time-saving, "go to" strike. The 6400 comes ready for use with prewired plug-in connectors for 12 or 24 VDC voltage that can be changed over to 12 or 24 VAC without a converter kit, two faceplates – one each for offset and centerline locks as well as a trim filler plate, mounting tabs and shims and a self-adhesive template for frame cuts. An optional "plug in" latchbolt monitor is also available and can be added in the field at any time after installation.

Features and benefits

- Modular design fits cylindrical and nearly any mortise lock
- Heavy-duty stainless steel construction in BHMA 630 satin finish
- Vertical adjustments allow for alignment with a wide variety of mortise locks with offset latches
- Horizontal adjustment of up to 1/8" improves fit on tight door preps
- Can accommodate up to 1" deadbolt (for night latch only)
- Field selectable voltage 12 or 24VDC and 12 to 24VAC
- Plug-in voltage connectors are included for ease of installation and removal during strike servicing
- Optional plug-in latchbolt monitor can be added in the field
- Non-handed, unique internal solenoid design prevents keeper from heating up
- Low current draw (0.19 amps @ 24 VDC)
- Suitable for interior and exterior doors
- 3-hour fire-rated to UL 10C (fail secure only)
- UL 1034 listed for burglary-resistant electric door strikes
- UL 294 listed for access control system
- CSFM California State Fire Marshal listed
- ANSI/BHMA A156.31, Grade 1 certified
- Static strength: 1500 lbs
- Dynamic strength 70 ft-lbs
- Endurance 2,000,000 cycles



Lockset compatibility

Vertical adjustment of the deadbolt keeper or deadlatch ramp allows for alignment with a wide variety of mortise locks with offset latches. Accommodates up to 1" deadbolt*. Up to 1/8" horizontal adjustment for misaligned frames.

* Night-latch function only, bolt will not release

6400 Series power requirements

Model	Mode	Voltage	Duty	Sound	Amps ¹	Ohms ²
6400	Fail-locked	12 VDC	Continuous	Silent	.375	37
6400	Fail-locked	24 VDC	Continuous	Silent	.190	148
6400	Fail-locked	12-24 VAC	Intermittent	Buzz	.280 - .565	37

Intermittent duty = Energized less than 1 min, with duty ratio 1:5;

Continuous duty = Energized 1 min, or more.

¹ Ratings are based on maximum current draw at +10°C and include initial power-up current draw.

² Nominal resistance at +25°C +/- 7% tolerance.

Model specifications

Model number	6400
Latchbolt throw	(Also accommodates 1" deadbolt as a nightlatch only - no release)
Backbox depth	4 7/8" (Includes two face plates: Centerline and Off-set latch entries)
Backbox depth	1 1/4"
Finish	US 32D/BHMA 630
Lockset	Cylindrical, mortise, mortise exit
Number of doors	Single
Door/frame type	Hollow metal, aluminum and wood
Options	2 Rectifier kits: ▪ S012 Converts 12 VAC voltage to 12 VDC to operate the solenoid ▪ S024 Converts 24 VAC voltage to 24 VDC to operate the solenoid
	(Entry Buzzer)
Certifications	ANSI/BHMA A156.31 Grade 1, 3-hour fire rated to UL 10C (FSE only), UL 1034, UL 294, CSFM
Applications notes	Modular electric strike ideal for aftermarket applications. Fail-secure only for fire-rated openings.

6400 Series modular strike for mortise and cylindrical locksets

Von Duprin Door control and security hardware • 19

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Submission Date: April 14/26

GT710/8710

Low-Energy
ADA Swing Door Operator
Where SOLUTIONS are AUTOMATIC



Product Features and Benefits

- Hydraulic design offers **proven reliability**
- Adjustable closing speeds to **enhance energy savings**
- Manual mode requires very little pressure to open **promoting ease of operation**
- Approved on fire door assemblies rated up to 3 hours, **maintaining security and safety**
- Hydraulic back-check during windy conditions **protects the door and operator from damage**

CDH

Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

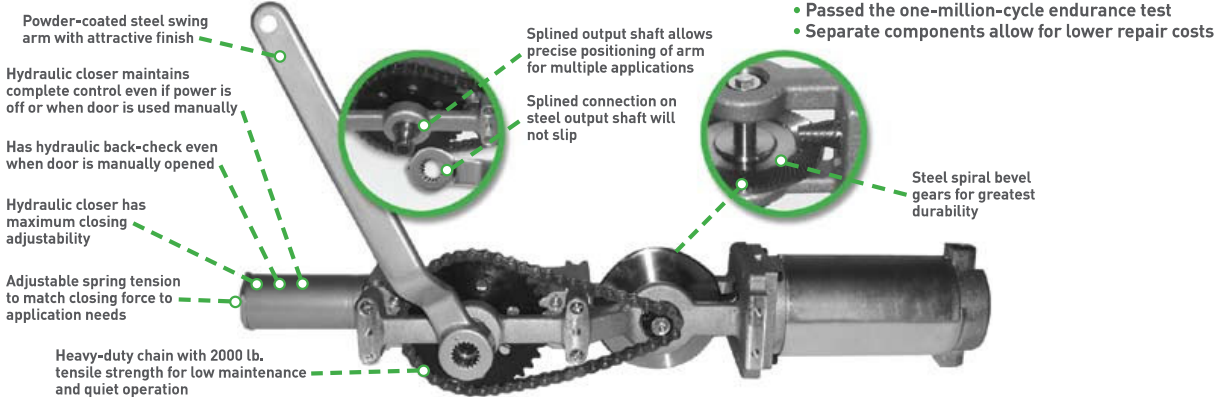
Mosiac House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26



GT710/8710 Low-Energy ADA Swing Door Operator

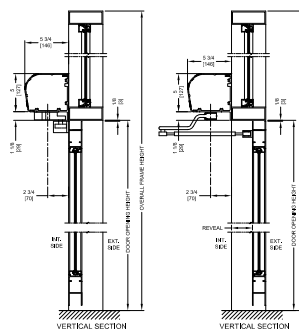
The NABCO GT710/8710 Low-Energy Operator is engineered for interior and exterior use, and designed to automate essentially any new or existing door frame. The GT710/8710 operates in both automatic and manual modes with a hydraulic back-check that protects the door and mechanical operator from damage when forced open in windy conditions or when manually operated. The GT710/8710 Operator has been approved for use on fire door assemblies rated up to 3 hours. The low-energy performance, combined with the adjustable opening and closing speeds, reduces energy consumed, which offers a prompt return on your investment.



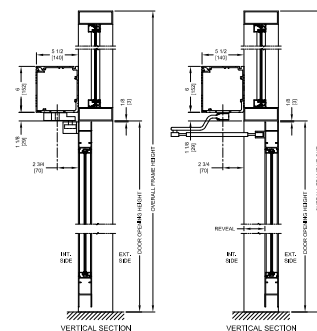
PRODUCT INFORMATION

Header dimensions	Side load - 5" H X 5 3/4" D (GT710) curved header Side load - 6" H X 5 1/2" D (GT8710)
Standard finish	Clear and dark bronze anodized
Optional finishes	Painted, clad, special anodized
Mounting	Surface applied or overhead concealed
Installation types	Push or pull
Operating voltage	120 VAC @ <5 amps
Auxiliary power output	12VDC 750mA
Operator drive	Electro-hydraulic
Motor voltage	Pulse width modulated
Motor type	1/8th HP @ peak
Control type	Microprocessor
Door panel weight	300 lbs.
Adjustable open	Force and speed
Adjustable close	Force and speed
Closing method	Spring/hydraulic [with selectable power assist]
Adjustable opening angle	Up to 145°
Power boost close	Selectable
Basic features	Low-energy operation Push and go Obstacle detection in opening and closing cycles Sequential or timer mode operation LCD display for programming and diagnostics Open- or closed-circuit safety inputs Momentary or maintained activation
Switch modes	On, off, hold-open
Opening and closing speed	Adjustable
Hold-open time	Adjustable [0-30 seconds]
Code compliances	ANSI A156.19/ANSI A117.1
Approvals	UL, ULC

GT710 Operator



GT8710 Operator



CONFIGURATIONS:

The GT710/8710 is available for multiple configurations, such as single doors, simultaneous pairs, and dual-egress, as well as the Opman configuration, which is a single continuous header for a pair of doors containing a manual closer on one side and an automatic operator on the other.

NABCO Service and Specifications

Along with the NABCO factory branches, NABCO has the largest independently owned network of automatic door distributors in North America. Their friendly, qualified installers and technicians always strive to exceed your expectations from install to after-sales service. NABCO's factory branches and independent distributors provide AAADM-certified technicians to ensure your doors meet all ANSI A156.10/A156.19 standards.

Complete three-part specifications and CAD drawings are available on the NABCO website.



Member of the Nabtesco Group

NABCO ENTRANCES INC.

S82 W18717 Gemini Drive | Muskego, WI 53150 | 877-622-2694 | Fax 888-679-3319

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Distributed by:

06/15

CDH

Commercial Doors & Hardware Ltd.
2150 Winston Park Drive, Unit 16
Oakville, L6H 5V1

Mosaic House Commercial Space Fit up.
5676 Main st Whitchurch-Stouffville

Submittal Date: April 14/26

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide glass and glazing including but not limited to following:
- 1.2.1.1. glazing borrowed lights and screens.
 - 1.2.1.2. glazing wood doors (glass).
 - 1.2.1.3. window film.
 - 1.2.1.4. miscellaneous specialty glass, gaskets, tapes and glazing materials.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Provision of architectural woodwork: Section 06 40 00 - Architectural Woodwork.
 - 1.2.2.2. Supply of hollow steel doors and frames: Section 08 11 13 - Steel Doors and Frames.
 - 1.2.2.3. Supply of wood doors: Section 08 14 00 - Wood Doors.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. EPDM: Ethylene Propylene Diene Monomer.
 - 1.3.1.2. GANA: Glass Association of North America; www.glasswebsite.com.
 - 1.3.1.3. MSDS: Material Safety Data Sheets.
 - 1.3.1.4. MSVD: Magnetically Sputtered Vacuum Deposition.
 - 1.3.1.5. OBC: Ontario Building Code.
 - 1.3.1.6. PVB: Polyvinyl Butyral.
 - 1.3.1.7. PVC: Polyvinyl Chloride.
 - 1.3.1.8. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
 - 1.3.1.9. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
 - 1.3.1.10. VOC: Volatile Organic Compound.

1.3.2. Definitions:

- 1.3.2.1. Pattern Glass: One type of rolled glass having a pattern impressed on 1 or both sides for light control, bath enclosures and decorative glazing. Sometimes called “rolled”, “figured”, or “obscure” glass.
- 1.3.2.2. Sandblasted Finish: Surface treatment for flat glass obtained by spraying glass with hard particles to roughen 1 or both surfaces of glass. Effect is to increase obscurity and diffusion.
- 1.3.2.3. United Inches: Total of 1 width and 1 height of a lite of glass in inches.

1.3.3. Reference Standards:

- 1.3.3.1. ANSI Z97.1-04 Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test
- 1.3.3.2. ANSI/ASME B18.6.3-03(08) Machine Screws and Machine Screw Nuts
- 1.3.3.3. ASTM C509-06 Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
- 1.3.3.4. ASTM C864-05 Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
- 1.3.3.5. ASTM C920-08 Standard Specification for Elastomeric Joint Sealants
- 1.3.3.6. ASTM C1036-06 Standard Specification for Flat Glass
- 1.3.3.7. ASTM C1048-04 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass
- 1.3.3.8. ASTM C1115-06 Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories
- 1.3.3.9. ASTM C1349-04 Standard Specification for Architectural Float Glass Clad Polycarbonate
- 1.3.3.10. ASTM C1503-01 Standard Specification for Silvered Flat Glass Mirror
- 1.3.3.11. CAN/CGSB-12.6-M91 Transparent (One-Way) Mirrors
- 1.3.3.12. CAN/CGSB-12.12-M90 Plastic Safety Glazing Sheets
- 1.3.3.13. CAN/CGSB-12.13-M91 Patterned Glass
- 1.3.3.14. CAN/CGSB-12.20-M89 Structural Design of Glass for Buildings
- 1.3.3.15. CAN4-S104-M80(85) Standard Method of Fire Test of Door Assemblies
- 1.3.3.16. CAN4-S106-M80(85) Standard Method For Fire Test of Windows and Glass Assemblies
- 1.3.3.17. NFPA 80-07 Standard for Fire Doors and Fire Windows

1.4. SUBMITTALS

1.4.1. Samples:

1.4.1.1. Submit samples of materials identifying quality and type of glass if required by the Consultant before commencing work. Ensure samples are clearly labelled with manufacturer's name and type.

1.4.1.2. Submit following samples:

1.4.1.2.1. window film.

1.5. CLOSEOUT SUBMITTALS

1.5.1. Operation and Maintenance Data: Provide maintenance data indicating cleaning instructions for inclusion into Maintenance Manual.

1.6. QUALITY ASSURANCE

1.6.1. Qualifications

1.6.1.1. Installers: Provide experienced installer who is trained and experienced in glass and glazing requirements of this Section including familiarization with standards specified herein and capable to instruct installation requirements of this Section.

1.7. DELIVERY, STORAGE AND HANDLING

1.7.1. Delivery and Acceptance Requirements: Deliver glass and associated materials to Site in original crates and containers with manufacturer's name and brand distinctly marked thereon and with glass labelled as to types. Do not remove labels on glass until after work is accepted by the Consultant.

1.7.2. Storage and Handling Requirements: Store materials within the building, in a clean, dry location, acceptable to, or as designated by, the Consultant. Fully protect materials from damage of any kind until ready for use.

1.8. SITE CONDITIONS

1.8.1. Ambient Conditions: Do not perform glazing when temperature is less than 7 deg C (44 deg F) or sash or frames are wet, damp or frosted.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:
- 2.1.1.1. AGC Flat Glass North America Ltd.; www.na.agc-flatglass.com
 - 2.1.1.2. Dow Corning; www.dowcorning.com
 - 2.1.1.3. Guardian Industries Corp.; www.guardian.com
 - 2.1.1.4. Momentive Performance Materials; www.momentive.com
 - 2.1.1.5. PPG Canada Inc.; www.ppgglazing.com
 - 2.1.1.6. Pilkington Special Glass Limited; www.pilkington.com
 - 2.1.1.7. TechniGlas, A Division of ProScience Inc.; www.fireglass.com
 - 2.1.1.8. Tremco Canada; www.tremcosealants.com
 - 2.1.1.9. Viracon; www.viracon.com
 - 2.1.1.10 Equivalent
- 2.1.2. Single Source Responsibility for Sealants, Gaskets and Other Glazing Accessories: Ensure consistent quality of performance by providing glazing sealant and seals from single manufacturer.

2.2. MATERIALS

- 2.2.1. Description:
- 2.2.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.
- 2.2.2. Performance/Design Criteria:
- 2.2.2.1. Design glass and glazing to CAN/CGSB-12.20-M complying to OBC design and fire rating requirements and regulations of Authorities Having Jurisdiction, being the minimum, except where more stringent requirements are specified herein. In case of conflict of requirements comply with most stringent requirements.
 - 2.2.2.2. Provide accessories, closures and trims required and necessary to complete work.
 - 2.2.2.3. Deflection: Limit glass deflection to flexural limit of glass with full recovery of glazing materials.
- 2.2.3. Glass: Free from bubbles, waves, discolouration and other defects and of following types for locations indicated on the Drawings or noted on Door Schedule. Ensure glass bears manufacturer's label indicating quality. Leave labels in place until final cleaning.

2.2.4. Single Glazed Glass Types:

- 2.2.4.1. Tempered Glass (TGL): Clear transparent tempered glass conforming to ASTM C1048, Kind FT and meeting requirements of ANSI Z97.1, minimum 6 mm (1/4") thick. Ensure surface compression is equal to or greater than 69 MPa (10 000 psi).
- 2.2.4.2. Tempered Laminated Glass (TLGL): Clear transparent laminated tempered glass conforming to ASTM C1172, Kind LT and meeting requirements of ANSI Z97.1, minimum 6 mm (1/4") thick overall; clear PVB interlayer of 1.6 mm (0.060") thickness.
- 2.2.4.3. Back Painted Glass (BPG) Tempered glass, back painted, conforming to ASTM C1048, Kind FT and meeting requirements of ANSI Z97.1, 6 mm (1/4") thick. Available from Lakeshore Glass, Toronto or Equivalent. Colour to Architect's later selection
- 2.2.4.4. Fire-Rated, Safety-Rated Glass Ceramic (FRG): Clear, transparent, 8mm thick laminated 45-minute fire-rated and impact safety-rated glazing material, to be FireLite Plus by Technical Glass Products (TPG) or Equivalent. Glass surface shall be "superior grade" finish. Impact safety-rated-meets ANSI Z97.1 and CPSC 16 CFR1201 (Cat. I and II). Each piece of FireLite Plus, or Equivalent, shall be permanently labeled with the FireLite Plus or Equivalent logo, UL logo and fire rating. Sizes as indicated on Drawings.

2.2.5. Window Film: Provide "3M Scotchcal ElectroCut Special Effects Film" by 3M www.3m.com in colour "7725-314 Dusted Crystal", or Equivalent, translucent opacity, transparent synthetic liner, clear pressure sensitive adhesive. Ensure film cutouts suit design and are located on glass doors and other areas as indicated on the Drawings.

2.2.6. Glazing, Sealing Compounds and Accessories:

- 2.2.6.1. Ensure glazing, sealing compounds and accessories are compatible with contact surfaces of frames, other accessories used in glazing system and contact surfaces of compounds used on insulated glass units. Wood or other organic materials are not acceptable for use in glazing systems including spacer blocks.
- 2.2.6.2. Glazing Compound: Non-hardening modified oil type. Colour to match adjacent surfaces unless indicated otherwise.
- 2.2.6.3. Sealant Compound: One component type, elastomeric chemical curing, ASTM C920, Type S, Grade NS. Colour to match adjacent surfaces unless indicated otherwise in the Contract Documents.
- 2.2.6.4. Sealant Compound: ASTM C920, multi-component chemical curing, Type M, Grade NS. Colour to match adjacent surfaces.
- 2.2.6.5. Sealant Compound: One component, silicone base solvent curing. Colour to match adjacent surfaces.
- 2.2.6.6. Sealant for Interior Glass-to-Glass Butt Glazing Installation: Translucent 1 part silicone sealant conforming to ASTM C920, Type S, Grade NS, "Tremsil® 200 General Construction Grade Silicone Sealant" by Tremco Canada, "Dow Corning 999-A Silicone Building & Glazing Sealant" by Dow Corning, "GE Contractors SCS1000 Silicone Sealant" by Momentive Performance Materials or Equivalent.
- 2.2.6.7. Cellular Gaskets for Compression Glazing: ASTM C509 cellular, elastomeric, preformed, black. Closed cell neoprene or EPDM extrusions including moulded corners where applicable by Cellular Rubber Extrusions, Tremco Canada or Equivalent.

- 2.2.6.8. Dense Gaskets for Compression Glazing: ASTM C864, Option II or ASTM C1115, Type C, dense neoprene or EPDM extrusions, 60 and 70 Durometer density including molded corners where applicable by Poly-Wej Gaskets, Tremco Canada or Equivalent.
- 2.2.6.9. Glazing Splines: Neoprene or EPDM manufacturer's standard dry glazing splines to suit aluminum extrusions. Colour to match adjacent surfaces unless indicated otherwise.
- 2.2.6.10. Glazing Points and Wire Spring Clips: Corrosion resistant, manufacturer's standards.
- 2.2.6.11. Edge Blocking, Setting Blocks, Later Shims, Gaskets and Tapes:
 - 2.2.6.11.1. Edge Blocking for Glass: 60 - 70 Durometer neoprene, silicone or EPDM, channel shaped, 100 mm - 150 mm (4" - 6") long.
 - 2.2.6.11.2. Setting Blocks: 7 mm x 100 mm (5/16 x 4") EPDM or extruded 80 - 90 Durometer neoprene; at insulating glass, use EPDM only. At fire-rated glazed doors and partitions, use similar sized fire-rated silicone GE "Gel 516" or Equivalent, or asbestos cement blocks. Width; 1.6 mm to 3 mm (1/16" to 1/8") less than design glazing pocket width. For 4 sided structural glazing, use silicone compatible rubber or silicone.
 - 2.2.6.11.3. Lateral Shims: Neoprene, silicone or EPDM, 40 - 60 Durometer, 100 mm (4") long or as required.
 - 2.2.6.11.4. Compression Glazing Tape: Preformed, ribbon-shaped, non-skinning, 100% solids, non-oxidizing polyisobutylene: butyl, paper release, EPDM shim with continuous synthetic rubber spacer rod of 60 Durometer hardness. Acceptable Product: "Polyshim II Tape" by Tremco Canada or Equivalent. Ensure tape is sufficiently wide and thick to completely cover bite area of glazing unit when unit is pushed into place.
- 2.2.7. Primer Sealers and Cleaners: To glass and plastic glazing manufacturer's standards.
- 2.2.8. Fabrication:
 - 2.2.8.1. Label each light of glass and/or plastic glazing with registered name of Product and weight and quality of glass and/or plastic glazing.
 - 2.2.8.2. Check dimensions on job Site before cutting materials.
 - 2.2.8.3. Grind and chamfer edges of unframed glass and mirrors. Grind and chamfer edges of glass shelves and sliding doors.
 - 2.2.8.4. Ensure minimum bite or lap of glass and/or plastic glazing on stops and rabbets as recommended by glass and/or plastic glazing manufacturer.

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions:

- 3.1.1.1. Verify the actual Site dimensions and location of adjacent materials prior to commencing work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.1.2. Ensure glass is not more than 4 mm (3/16") less than the rebate size in either dimension, with allowance for edge spacers, shims and setting blocks as required.

3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

3.2.1. Surface Preparation:

- 3.2.1.1. Thoroughly clean glass rebates and glass of dust, dirt, mortar and other foreign materials prior to glazing. Remove oils and grease with non-staining solvents such as Xycol or Methyl Ethyl Ketone solutions.
- 3.2.1.2. Properly prime, before glazing, glazing rebates in wood doors.

3.3. INSTALLATION

3.3.1. Perform the work of this Section in accordance with "GANA Glazing Manual, 2004" and GANA Laminated Glazing Reference Manual, 2006" for laminated glazing installation methods.

3.3.2. If required, thoroughly mix glazing compound as recommended by manufacturer. Thinning of glazing compound will not be permitted.

3.3.3. Carefully remove glazing stops and replace after glazing. Take care to prevent damage to stops.

3.3.4. Doors, Screens, Sidelites and Interior Windows:

- 3.3.4.1. Place setting blocks on sill at 1/4 points from each corner unless otherwise directed by glazing manufacturer.
- 3.3.4.2. Place continuous glazing gaskets on edges of glass.
- 3.3.4.3. Centre and space each piece of glass with spacers located and installed according to manufacturer's directions.
- 3.3.4.4. Place glass so no voids occur between glass and glazing material and glazing stops.
- 3.3.4.5. Secure glass in place with stops, secured in place with screws.

3.3.5. Glazing Sealant:

- 3.3.5.1. Apply glazing sealant to clean, dry, grease and oil free surfaces. Provide exposed glazing sealant smooth, free from ridges, wrinkles, air pockets and embedded foreign materials.
- 3.3.5.2. Prime surfaces if required by glazing sealant manufacturer.
- 3.3.5.3. Trim glazing sealant flush with tops of stops and glazing channels.

- 3.3.5.4. Remove excess glazing sealant or droppings which would set up or become difficult to remove from finished surfaces. Do not use chemicals, scrapers, or other tools which would affect finished surfaces.

3.3.6. Interior Glazing:

3.3.6.1. Tape/Tape Method:

- 3.3.6.1.1. Cut glazing tape to proper length and install against permanent stop projecting 1.6 mm (1/16") above sightline.
- 3.3.6.1.2. Place glazing tape on free perimeter of glass projecting 1.6 mm (1/16") above sightline.
- 3.3.6.1.3. Trim off excess tape to sightline.

3.3.6.2. Combination Method-Tape/Sealant:

- 3.3.6.2.1. Cut glazing tape to proper length and install against permanent stop projecting 1.6 mm (1/16") above sightline.
- 3.3.6.2.2. Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
- 3.3.6.2.3. Trim off excess tape to sightline.

3.3.6.3. Window Film:

- 3.3.6.3.1. Install window film in accordance with manufacturer's printed instructions by experienced film applicators as recommended by glass film manufacturer.
- 3.3.6.3.2. Ensure glass surfaces are clean and ambient temperature is between 16 deg C and 38 deg C (61 deg F and 100 deg F).
- 3.3.6.3.3. Whenever 2 or more pieces of same colour translucent film are seamed together as a continuous band of colour, they must match to ensure uniform reflects daytime colour and transmitted night appearance.

3.4. SITE QUALITY CONTROL

- 3.4.1. Site Tests and Inspections: Ensure framing to be glazed is plumb, secure and permanently fixed in position.
- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

3.5. CLEANING

- 3.5.1. Clean installed glass and metal frequently during construction. Avoid etching and staining glass and metal during construction.
- 3.5.2. Remove sealant and compound droppings from finished surface.
- 3.5.3. Remove markings and labels at time of final clean-up. Ensure final clean-up is carried out in accordance with glass and sealant manufacturer's recommendations to the Consultant's satisfaction.
- 3.5.4. Avoid storing materials adjacent to glass.

3.6. PROTECTION

- 3.6.1. Provide and maintain necessary protection of completed work against damage.
- 3.6.2. Do not mark or attach anything directly to exposed glass and framing surfaces.
- 3.6.3. If welding is to take place above or near completed glazing work, protect glass with plywood or other suitable means to reduce likelihood of weld spatter damaging glass surfaces.
- 3.6.4. Protect glass from other trades, workers, tools and other similar materials.
- 3.6.5. Replace cracked, broken, or defective glass at no additional cost to the Owner and to the Consultant's satisfaction.
- 3.6.6. Identification of Glazing: Mark glass lites with temporary, easily removable, large safety markings, immediately after glass installation. Maintain safety markings until final clean-up.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to herein.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide architectural window films where shown on Drawings.

1.3. REFERENCES

- 1.3.1. ASTM International (ASTM)

1.3.1.1. ASTM E 903 – Standard Methods for Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.

1.3.1.2. ASTM 308 – Standard Recommended Practice for Spectrophotometry and Description of Colour in CIE 1931 System.

1.4. SUBMITTALS

- 1.4.1. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. Indicate locations where film is being applied.
- 1.4.2. Samples: Submit 100 mm x 100 mm samples of each film type.
- 1.4.3. Contractor shall provide samples to Consultant for written approval prior to installation.
- 1.4.4. Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods.

1.5. CLOSEOUT SUBMITTALS

- 1.5.1. Operational and Maintenance Data: Submit 3 copies of Product maintenance manual to Consultant prior to completion of the Work. Ensure manual contains specific maintenance recommendations and gives specific warning of any maintenance practice or materials which may damage window shades.

1.6. MAINTENANCE MATERIAL SUBMITTALS

- 1.6.1. Extra Stock Materials: Provide 5 percent of extra stock.

1.7. QUALITY ASSURANCE

- 1.7.1. Qualifications:

1.7.1.1. Obtain all products in this Section from a single manufacturer with a minimum of 10 years experience..

1.7.1.2. Installer: Installation shall be performed by a trained and qualified installer, specialized and experience in work required for this project.

1.8. DELIVERY, STORAGE AND HANDLING

- 1.8.1. Delivery and Acceptance Requirements: Deliver materials undamaged in original wrappings or containers, with manufacturer's labels and seals intact.

1.8.2. Storage and Handling Requirements:

1.8.2.1. Store materials undamaged in original wrappings or containers, with manufacturer's labels and seals intact. Store materials in a warm, dry area.

1.8.2.2. Prevent damage to materials during handling and storage.

1.9. WARRANTY

1.9.1 Warranty shall be for 3 years from the date of Substantial Performance of the Contract.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Convenience Group/3M Company www.3m.com

2.1.1.2. Equivalent

2.2. MATERIAL STANDARD

2.2.2. Design based on 3M CRYSTAL Glass Finishes or Equivalent

2.3. MATERIAL PROPERTIES

2.3.1. General: Glass finishes field-applied application to glass or plastic material as visual opaque or decorative film.

2.3.2. Film: Vinyl

2.3.3. Adhesive: Acrylic, Pressure Sensitive, Permanent

2.3.4. Liner: Silicone-coated Polyester

2.3.5. Thickness (Film and Adhesive without Liner):

2.3.5.1. Frosted – 4.7 mil

2.3.5.2. Security – 6 mil

2.3.6. Fire Performance:

2.3.6.1. Flame Spread: 25 maximum

2.3.6.2. Smoked Developed: 450 maximum

2.4. OPTICAL PERFORMANCE

- 2.4.1. CRYSTAL Frosted Decorative / Privacy Glazing Film shall be 3M Amber 35 Low E film or Equivalent.
 - 2.4.1.1. Ultraviolet Transmittance (ASTM E 903) : 20 percent
 - 2.4.1.2. Visible Light Transmittance (ASTM E 903) ASTM E 308): 72 percent.
 - 2.4.1.3. Visible Light Reflectance (ASTM E 903) : 12 percent.
 - 2.4.1.4. Solar Heat Transmittance: 64 percent.
 - 2.4.1.5. Solar Heat Reflectance: 10 percent.
 - 2.4.2.6. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): 0.82
- 2.4.3. Security film, micro-layered, tear-resistant film.
 - 2.4.2.1. Ultra 600 by 3M.
 - 2.4.2.2. Tear Resistance 1,000 lbs %
 - 2.4.2.3. Tensile Strength 32,000 psi
 - 2.4.2.4. Break Strength 210 lbs/in
 - 2.4.2.5. Elongation at Break 115%
 - 2.4.2.6. Peel Strength >8lbs/in
 - 2.4.2.7. Abrasion Resistance <3%

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Examine substrate(s) for compliance. Do not proceed with installation until unsatisfactory conditions have been corrected.
- 3.1.2. Refer to the applicable 3M Technical Data Sheet to determine compatibility of finish to substrate.
- 3.1.3. Do not proceed with installation until unsatisfactory conditions have been corrected.
- 3.1.4. Responsibility for state of surfaces prior to installation to be pre-determined by installation specialist.
- 3.1.5. Scheduling of installation by Contractor implies that substrate and conditions are prepared and ready for product installation per the recommendations of the installation specialist.
- 3.1.6. Proceeding with the installation implies installer's acceptance of substrate and conditions.

3.2. SURFACE PREPARATION

- 3.2.1. Comply with all manufacturer's instructions for surface preparation.
- 3.2.2. Thoroughly clean substrate of substances that could impair the overlay's bond, including mold, mildew, oil, grease.
- 3.2.3. Re-clean surfaces with appropriate surface prep solvent and remove any haze or surface contamination.

3.3. APPLICATION

- 3.3.1. Application must be performed by qualified installer.
- 3.3.2. Do not proceed with installation until all finishing work has been completed in and around the work area.
- 3.3.3. Verify pattern prior to material acquisition.
- 3.3.4. Comply with manufacturer's installation instructions applicable to products and applications, indicated, except where more stringent requirements apply.
- 3.3.5. Install substrates with no gaps or overlaps. Form smooth, wrinkle-free, bubble-free surface for finished installation.
- 3.3.6. Remove air bubbles, wrinkles, blisters and other defects. Use approved procedures to prevent the formation of air bubbles, wrinkles, blisters and other defects.
- 3.3.7. Refer to applicable 3M Installation Guide for additional details.

3.4. CLEANING AND PROTECTION

- 3.4.1. Use cleaning methods recommended by architectural surfacing manufacturer for applicable environment.
- 3.4.2. Protect completed glass finish during remainder of construction period.
- 3.4.3. Consult with authorized installation specialist for project specifics.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide gypsum board work including but not limited to following:
- 1.2.1.1. steel studs and furring channels.
 - 1.2.1.2. gypsum board ceilings, partitions, bulkheads and soffits.
 - 1.2.1.3. corner beads, casing beads, trim, control joints and corner reinforcement.
 - 1.2.1.4. taping and filling.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Grouting of door frames: Section 06 90 00 - General Installations.
 - 1.2.2.2. Firestopping, smoke seals and penetration firestopping: Section 07 84 00 - Firestopping and Smoke Seals.
 - 1.2.2.3. Finish painting of gypsum board: Section 09 91 00 - Painting.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. CSA: Canadian Standards Association; www.csa.ca.
 - 1.3.1.2. MSDS: Material Safety Data Sheets.
 - 1.3.1.3. OBC: Ontario Building Code.
 - 1.3.1.4. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
 - 1.3.1.5. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
 - 1.3.1.6. VOC: Volatile Organic Compound.
- 1.3.2. Definitions:
- 1.3.2.1. Drywall: Gypsum board.
- 1.3.3. Reference Standards:
- 1.3.3.1. ASTM A653/A653M-07 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3.3.2.	ASTM A666-03	Standard Specification for Annealed or Cold Worked Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar
1.3.3.3.	ASTM A1011/A1011M-07	Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
1.3.3.4.	ASTM C475/C475M-02(07)	Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
1.3.3.5.	ASTM C514-04	Standard Specification for Nails for the Application of Gypsum Board
1.3.3.6.	ASTM C645-08a	Standard Specification for Nonstructural Steel Framing Members
1.3.3.7.	ASTM C754-07	Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
1.3.3.8.	ASTM C834-05	Standard Specification for Latex Sealants
1.3.3.9.	ASTM C840-08	Standard Specification for Application and Finishing of Gypsum Board
1.3.3.10.	ASTM C919-08	Standard Practice for Use of Sealants in Acoustical Applications
1.3.3.11.	ASTM C920-08	Standard Specification for Elastomeric Joint Sealants
1.3.3.12.	ASTM C954-07	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
1.3.3.13.	ASTM C1047-05	Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
1.3.3.14.	ASTM C1177/C1177M-06	Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
1.3.3.15.	ASTM C1280-07	Standard Specification for Application of Gypsum Sheathing
1.3.3.16.	ASTM C1325-08	Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets
1.3.3.17.	ASTM C1396/C1396M-06a	Standard Specification for Gypsum Board
1.3.3.18.	ASTM C1629/C1629M-06	Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
1.3.3.19.	ASTM C1658/C1658M-06	Specification for Glass Mat Gypsum Panels
1.3.3.20.	ASTM D3273-00(05)	Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
1.3.3.21.	ASTM D4060-07	Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
1.3.3.22.	ASTM D5420-04	Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

1.3.3.23. ASTM E84-08a	Standard Test Method for Surface Burning Characteristics of Building Materials
1.3.3.24. ASTM E90-04	Standard Test Method for Laboratory Measurement for Airborne Sound Transmission Loss of Building Partitions
1.3.3.25. ASTM E96/E96M-05	Standard Test Methods for Water Vapor Transmission of Materials
1.3.3.26. ASTM E119-08a	Standard Test Methods for Fire Tests of Building Construction and Materials
1.3.3.27. CAN/ULC-S101-07	Standard Methods of Fire Endurance Tests of Building Construction and Materials
1.3.3.28. ASTM E695-03	Standard Test method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading
1.3.3.29. ASTM E814-08b	Standard Test Method for Fire Tests of Penetration Firestop Systems
1.3.3.30. CSA A123.3-05	Asphalt Saturated Organic Roofing Felt
1.3.3.31. CSA S136-07	North American Specification for Design of Cold-Formed Steel Structural Members
1.3.3.32. CAN/CGSB-51.33-M89	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction
1.3.3.33. CAN/ULC-S101-07	Method of Test for Standard Methods of Fire Endurance Tests of Building Construction and Materials
1.3.3.34. CAN/ULC-S102-07	Surface Burning Characteristics of Building Materials and Assemblies
1.3.3.35. CAN/ULC-S114-05	Standard Method of Test for Determination of Non-Combustibility in Building Materials
1.3.3.36. CAN/ULC-S115-05	Standard Method of Fire Tests of Firestop Systems
1.3.3.37. CAN/ULC-S702-97	Standard for Thermal Insulation Mineral Fibre for Buildings

1.4. ADMINISTRATIVE REQUIREMENTS

1.4.1. Sequencing:

- 1.4.1.1. Coordinate installation and cooperate with mechanical and electrical Subcontractors to accommodate mechanical electrical items and any other work required to be incorporated into or coordinated with ceiling and soffit systems.
- 1.4.1.2. Cooperate and coordinate with Sections applying wet trades and Subcontractors installing mechanical and electrical services. Coordinate stud layout at partitions accommodating wall mounted fixtures by other trades.

1.5. SUBMITTALS

- 1.5.1. Shop Drawings: Submit Shop Drawings in accordance with Section 01 30 00 – Administrative Requirements showing design, construction, sound attenuating construction, adjacent construction, elevations, finishes and relevant details of furring, enclosures and partitions which require fire rating.

- 1.5.2. Samples: Submit samples in accordance with Section 01 30 00 – Administrative Requirements. Submit following samples in sizes indicated:

1.5.2.1. each trim accessory a minimum of 300 mm (12") long.

1.6. QUALITY ASSURANCE

- 1.6.1. Qualifications:

1.6.1.1. Installers: Provide the work of this Section executed by competent installers with a minimum of 5 years' experience in application of Products, systems and assemblies specified.

1.7. DELIVERY, STORAGE AND HANDLING

- 1.7.1. Delivery and Acceptance Requirements: Deliver materials to Site with the manufacturer's original labels intact. Do not remove wrappings until ready for use.

- 1.7.2. Storage and Handling Requirements:

1.7.2.1. No outside storage permitted. Store in clean, dry area, off ground. Provide adequate ventilation to avoid excess moisture, surface relative humidity and mould or fungal growth. Remove immediately any board showing signs of mould, mildew or fungal growth.

1.7.2.2. Stack gypsum board flat on level and dry surface without overhanging boards. Prevent sagging and damage to edges, ends and surfaces. Protect bagged Products from moisture or wetting.

1.8. SITE CONDITIONS

- 1.8.1. Ambient Conditions:

1.8.1.1. Do not install the work of this Section in any area unless satisfied that work in place has dried out and that no further installation of materials requiring wetness, moisture or dampness is contemplated. Ensure relative humidity in area of the work of this Section does not exceed 55% for duration of the Contract.

1.8.1.2. Ensure temperature of surrounding areas is min 13 deg C (55 deg F) and max 21 deg C (70 deg F) for 7 Days before and during application of gypsum board; maintain for 4 Days thereafter. Ensure heat is provided at appropriate time before work has started to bring surrounding and adjacent materials up to required temperature and maintained as specified. Avoid concentrated or irregular heating during drying by means of deflectors or protective screens.

1.8.1.3. Ensure ventilation is provided for proper drying of joint filler and adhesive and to prevent excessive humidity. Do not force dry adhesives and joint treatment.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:

2.1.1.1. Bailey Metal Products Ltd.; www.bmp-group.com

2.1.1.2. CertainTeed Corporation; www.certainteed.com

2.1.1.3. CGC Inc; www.cgcinc.com

- 2.1.1.4. Chicago Metallic; www.chicagometallic.com
- 2.1.1.5. Georgia-Pacific Canada, Inc.; www.gpgypsum.com
- 2.1.1.6. Gordon Incorporated; www.gordongrid.com
- 2.1.1.7. Roll Formed Specialty; www.rollformed.com
- 2.1.1.8. Trim-Tex Inc.; www.trim-tex.com
- 2.1.1.9. Unifix Inc.; www.unfixinc.com
- 2.1.1.10. NELCO; www.nelcoworldwide.com
- 2.1.1.11. Equivalent

2.2. MATERIALS

2.2.1. Performance/Design Criteria:

- 2.2.1.1. Obtain services of Professional Engineer, with experience in type of work of comparable complexity and scope, to design, review and provide professional services for the work of this Section, if required.
- 2.2.1.2. Design ceiling suspension system in accordance with manufacturer's printed directions and conforming to ASTM C754 requirements. Do not suspend any items from structural steel deck. Do not support the work of this Section from, nor make attachments to, ducts, pipes, conduits or support framing of other Subcontractors.
- 2.2.1.3. Design suspended ceiling system for adequate support of electrical fixtures as required by the Electrical Safety Authority of Ontario.
- 2.2.1.4. Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

- 2.2.2. Steel Studs: Conforming to CSA S136 and ASTM C645, galvanized sheet steel, minimum 18 mils designation thickness (0.455 mm (0.0179") minimum base steel thickness) minimum Z120 (G40) zinc coating, screw able with crimped web and returned flange, of depth shown in maximum continuous lengths possible. Provide thicker steel where required due to height.
- 2.2.3. Heavy Duty Studs at Openings: Conforming to CSA S136 and ASTM C645, galvanized sheet steel, minimum 54 mils designation thickness (1.367 mm (0.0538") minimum base steel thickness, minimum Z120 (G40) zinc coating, screw able with crimped web and returned flange, of depth shown in maximum continuous lengths possible. Provide thicker steel where required due to height.
- 2.2.4. Furring Channels: Conforming to CSA S136 and ASTM C645, galvanized sheet steel, minimum 33 mils designation thickness (0.836 mm (0.0329") minimum base steel thickness or minimum 18 mils designation thickness (0.455 mm (0.0179") minimum base steel thickness) minimum Z120 (G40) zinc coating, screw channels, 67 mm (2-5/8") wide x 22 mm (7/8") deep.
- 2.2.5. Carrying Channels for Gypsum Board: Conforming to CSA S136 and ASTM C645, galvanized sheet steel, minimum 43 mils designation thickness (1.087 mm (0.0428") minimum base steel thickness, minimum Z120 (G40) zinc coating, 38 mm (1-1/2") high with 19 mm (3/4") flanges, for primary carrying member in suspended ceilings and as horizontal stiffeners or bracing in metal stud systems.
- 2.2.6. Gypsum Board (GB): Conforming to ASTM C1396/C1396M. Unless indicated otherwise use 1200 mm (4') wide standard facing board in maximum continuous lengths up to 3600 mm (12'), beveled and/or

tapered edges to suit design requirements with butted square ends:

- 2.2.7. Abuse Resistant Gypsum Board (ARGB): Provide 1 of following:
- 2.2.7.1. Enhanced gypsum core encased in heavy duty paper facers on front and back, 16 mm (5/8"), conforming to ASTM C1396/C1396M and attaining a maximum of 0.014" as tested to ASTM D4060 (H-18 abrasion wheel, 500 grams, 200 cycles), a maximum of 0.123" indentation as tested to ASTM D5420 (72 in lbs) and a minimum of (133 ft lbs) as tested to ASTM E695 (50 lb bag) and ASTM C1629/C1629M Type X in fire rated assemblies, "ProRoc Abuse Resistant Type X" by CertainTeed Corporation or Equivalent.
 - 2.2.7.2. Enhanced gypsum core encased in fibreglass facers on front and back, 16 mm (5/8"), conforming to ASTM C1629/C1629M and attaining a maximum of 0.014" as tested to ASTM D4060 (H-18 abrasion wheel, 500 grams, 200 cycles), a maximum of 0.123" indentation as tested to ASTM D5420 (72 in lbs) and a minimum of (133 ft lbs) as tested to ASTM E695 (50 lb bag) and ASTM C1629/C1629M Type X in fire rated assemblies, "DensAmor Plus® Abuse Guard" by Georgia-Pacific Canada, Inc. or Equivalent.
- 2.2.8. Lead-Lined Gypsum: UL fire resistance rated, ASTM C36 "Type X" board, 15.9 mm thick. Lead sheet conforming to ASTM B 29 in uniform thickness. Lead liner to be 1mm thickness. Manufactured by Nelco, Burlington, Massachusetts, or Equivalent.
- 2.2.8. Joint Tape: Conforming to ASTM C475/C475M, provide following:
- 2.2.8.1. Regular Gypsum Board: Use kraft paper joint tape with feathered edges and minute perforations 50 mm (2") wide.
- 2.2.9. Joint Fillers and Topping Compound: Either slow or fast setting, low shrinkage type free of asbestos fillers and as recommended by the manufacturer. Use "Gyproc 90" by Georgia-Pacific Canada, Inc., "Durabond 90" by CGC Inc. or Equivalent at exterior soffits.
- 2.2.10. Metal Trim: CGC No.200-A or BMP D-4411 in lieu of "J" Mould. Do not provide "J" Mould (CGC No. 400-A) unless specifically noted on the Drawings as 'Exposed "J" Mould'.
- 2.2.11. Sound Control Materials:
- 2.2.11.1. Sound Attenuation Batts: Conforming to CAN/ULC-S702, mineral (glass and rock wool) fibre, flame spread and smoke developed in conformance with OBC requirements and requirements of other Authorities Having Jurisdiction in accordance with CAN/ULC-S102. Non-combustible in accordance with requirements of CAN/ULC-S114. Acceptable Products: "QuietZone Acoustical Batts" by Owens Corning, "Roxul AFB - Acoustical Fire Batts" by Roxul Inc., "Fibrex Sound Attenuation Batt (SAFB) Insulation" by Fibrex Insulations Inc., "Thermafibre Sound Attenuation Blankets" by CGC Inc., or Equivalent, of sufficient thickness to meet required STC rating for sound-rated partitions and of width to suit metal framing spaces.
 - 2.2.11.2. Strip Impalement Clips: 25 mm (1") wide strip of Insul-Hold by Insul-Hold Canada Ltd. or Equivalent, fabricated from 0.531 mm (25 ga) galvanized sheet metal in 30 m (100') rolls with punch-out insulation securement arrows. Alternatively, use special studs with punch-out impalement strips.
 - 2.2.11.3. Acoustic Sealant: Conforming to ASTM C834 and ASTM C920, Class 25, Non-hardening, "QuietZone Acoustic Sealant" by Owens Corning, "Tremco Acoustical Sealant" by Tremco Canada or Equivalent.
 - 2.2.11.4. Elastomeric Sealant: As recommended by manufacturer of fibre-reinforced gypsum sheathing board.

2.2.11.5. Gaskets: Closed cell neoprene, 3 mm (1/8") thick x 64 mm (2-1/2") wide.

2.2.11.6. Asphalt Felt: Conforming to CSA A123.3; No. 15 Type.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify the actual Site dimensions and location of adjacent materials prior to commencing work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Partition Types:
 - 3.2.1.1. Refer to the Drawings for partition types.
 - 3.2.1.2. Provide partitions complete to underside of structure, unless otherwise indicated on the Drawings.
- 3.2.2. Give a minimum of 48 hours' notice for the Consultant's inspection of internal wall insulation, vapour barriers and services prior to concealing with gypsum board.
- 3.2.3. Provide adequate ventilation to eliminate excessive moisture before commencing, and during, work to ensure proper drying of joint filler and adhesive. Do not force dry adhesive and joint treatment.
- 3.2.4. Examine substrate for compliance with applicable requirements, installation tolerances and other conditions affecting installation of fibre-reinforced gypsum board or sheathing. Do not proceed until unsatisfactory conditions have been corrected. Beginning of installation indicates acceptance of substrate conditions.
- 3.2.5. Carry out work using skilled tradesmen carefully supervised by competent foremen. Take measurements accurately.
- 3.2.6. Install framing, blocking and furring in accordance with ASTM C645, ASTM C1280 and ASTM C840.
- 3.2.7. Maintain wallboard panels minimum 6 mm (1/4") and maximum 13 mm (1/2") above floor to prevent moisture transfer. Unless otherwise shown, extend panels to minimum 100 mm (4") above finished ceiling and to underside of deck or structure where exposed and at fire rated and sound control partitions. Omit taping and filling of concealed surfaces above ceiling line, except at fire rated and sound control partitions and walls.
- 3.2.8. Erect plain wallboard vertically or horizontally, whichever results in fewer end joints. Keep end joints away from prominent locations and central portions of ceilings. Locate vertical joints at least 300 mm (12") from jamb lines of openings.
- 3.2.9. Space screws for regular wallboard at 300 mm (12") oc along board edges and in board field on walls and ceilings; at fire-rated assemblies, reduce spacings to comply with labelling Authorities assembly listings. For other specialty boards ensure screw spacing is in accordance with the manufacturer's recommendations.
- 3.2.10. Drive screws with power screw-gun and set with countersunk heads slightly below surface of board. Do not secure gypsum board by installing screws into aluminum or steel window and door frames.

- 3.2.11. Install resilient sponge tape where gypsum board ceilings abut heads of door frames and where wallboard abuts heads or jambs of exterior door and window frames. Adhere tape to casing bead and compress during installation. Compressed thickness; 1.6 mm (1/16").
- 3.2.12. At partitions except shaft walls, apply 1 continuous 6 mm (1/4") bead of acoustical sealant to each side of partition where gypsum board meets dissimilar materials. Where 2 layers of gypsum board per face are required, apply bead of sealant at perimeter of base layer only.
- 3.2.13. Apply sealant beads at perimeter of other services and like objects which penetrate wallboard in accordance with manufacturer's directions.
- 3.2.14. Metal Framing for Partitions and Bulkheads:
 - 3.2.14.1. Comply with recommendations of CGC Drywall Steel-Framed Systems Folder 09250-SA 923 for metal stud partition, ceiling, column fireproofing and bulkhead detailing.
 - 3.2.14.2. Provide partition tracks at floor and underside of ceiling or structure above. Align accurately. Lay out to partition layout.
 - 3.2.14.3. Erect partial height and curved partitions as indicated on the Drawings.
 - 3.2.14.4. Place studs vertically at 400 mm (16") oc unless otherwise specified, not more than 50 mm (2") from abutting walls, and at each side of openings and corners. Position studs in tracks. Cross brace studs as required to provide rigid installation.
 - 3.2.14.5. Provide heavy duty double boxed studs at each side of openings to extend in 1 piece from floor to underside of structure above.
 - 3.2.14.6. Co-ordinate erection of studs and installation of service lines.
 - 3.2.14.7. Provide continuous gasket to separate metal framing from masonry and concrete.
 - 3.2.14.8. Do not secure studs to exterior window framing, or to ceiling grid members.
 - 3.2.14.9. Provide continuous gasket between ceiling and floor tracks, and structure.
 - 3.2.14.10. Metal Stud Reinforcements: Provide hollow structural steel, stud, angle and steel plate sections, galvanized sheet steel minimum 1.214 mm (18 ga) where required to support manufactured components. Weld connections. Ensure rigid and secure installation capable of offering resistance to minimum 227 kg (500 lbs) pull force. Galvanize stud reinforcements in moist areas. Do not use wood blocking for this purpose. Provide additional reinforcing framing studs or furring channels secured between studs for attachment and support without limitations following:
 - 3.2.14.10.1. architectural woodwork.
 - 3.2.14.10.2. fitments and fixtures.
 - 3.2.14.10.3. equipment.
- 3.2.15. Provide continuous horizontal furring channels as backing to wall cabinets.
- 3.2.16. Access Doors and Panels: Install access doors and panels supplied as part of the work of Divisions 22, 23 and 26 and where required as part of the work of this Section in walls, bulkheads, ceilings and soffits.
- 3.2.17. Metal Furring:
 - 3.2.17.1. Erect furring in accordance with manufacturer's directions and as specified herein.
 - 3.2.17.2. Provide furring rigid, secure, square, level or plumb, framed and erected to maintain finish

dimensions and contours indicated. Allow for thermal movement.

3.2.17.3. Furr around ducts, pipes and dropped beams occurring in finished areas and for vertical gypsum board breaks within or at termination of ceilings.

3.2.17.4. Provide metal furring channels fastened to masonry or concrete surfaces in parallel rows at 400 mm (16") oc unless gypsum board is indicated to be adhered directly to masonry or concrete surfaces. Shim metal furring channels to provide a level surface.

3.2.18. Gypsum Board Application:

3.2.18.1. Provide gypsum board in accordance with manufacturer's written installation instructions and finish to requirements of ASTM C840. Ensure moisture resistant gypsum board is installed on any wall/partition containing a plumbing fixture (i.e. water closets, sinks, tubs, etc.).

3.2.18.2. Provide metal trim casing bead at junctions with dissimilar materials. Provide reveals at junctions with dissimilar materials where indicated.

3.2.18.3. Provide curved uniform surfaces by wetting or dampening board or scoring back gypsum board and form to profiles indicated. Provide additional screws and framing members to maintain design curve. Apply joint compound and trowel smooth to provide continuous, smooth radius free from flat spots, facets and trowel marks. Allow gypsum boards to dry thoroughly before handling.

3.2.18.4. Provide finished work plumb, level and true, free from perceptible waves or ridges and square with adjoining work.

3.2.18.5. Cut and fit gypsum board to accommodate or fit around other parts of the Work. Provide the work of this Section accurately and neatly.

3.2.18.6. Butt gypsum board sheets together in moderate contact. Do not force into place. Place tapered or wrapped edges next to one another.

3.2.18.7. Provide gypsum board perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints. If butt joints do occur stagger and locate them as far from centre of walls and ceilings as possible. Accurately fit exposed butt joints together and make edges smooth.

3.2.18.8. Support ends and edges on framing.

3.2.18.9. Fasten gypsum board to metal furring and metal studs with screws. Space screws at 200 mm (8") oc at board edges and 300 mm (12") oc on board field. Ensure perimeter screws are not less than 9 mm (3/8") nor more than 13 mm (1/2") from edges and ends are opposite screws on adjacent boards.

3.2.18.10. Gypsum Board - Single Layer:

3.2.18.10.1. Ceilings: Apply gypsum board to metal furring with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Space screws at 200 mm (8") oc.

3.2.18.10.2. Partitions: Apply gypsum board to metal studs with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Locate vertical joints at least 300 mm (12") from jamb lines of openings. Space screws at 200 mm (8") oc at board edges and 300 mm (12") oc on board field.

3.2.18.10.3. Ceiling and Partition Fasteners: Ensure perimeter screws are not less than

9 mm (3/8") nor more than 13 mm (1/2") from edges and ends are opposite screws on adjacent boards. Drive screws with power screw gun and set with countersunk head slightly below surface of board.

3.2.18.10.4. Joints: Finish all joints unless specified otherwise in the Contract Documents.

3.2.19. Metal Trim and Accessories:

3.2.19.1. Provide metal trim casing beads at reveals; at ceiling-wall intersections and partition perimeters; and at intersection of dissimilar constructions such as gypsum board to concrete.

3.2.19.2. Provide metal trim casing beads where gypsum board abutts against a surface having no trim concealing junction.

3.2.19.3. Provide a 13 mm (1/2") separation gasket between metal trim casing beads and window frames or other cold surfaces or provide sponge tape between gypsum board partition or furring framing, where such framing abuts exterior door or window frame, sponge tape between floor and gypsum board partition track. Ensure tape is either full width or 1 strip 9 mm (3/8") wide on each side of framing member.

3.2.19.4. Provide casing bead and sponge tape where gypsum board abuts materials other than itself and acoustic tile ceilings including at exterior door and window frames, where juncture is not concealed with trim; or elsewhere where indicated on the Drawings. Unless indicated otherwise, use tape 3 mm (1/8") narrower than casing bead to provide recess at exposed side. Compress tape by 25%.

3.2.19.5. Provide metal trim casing beads where indicated on the Drawings.

3.2.19.6. Provide pre-finished metal angle trim supports and provide light pockets and eggcrate grilles and/or louvres in accordance with manufacturer's instructions. Install light pockets and eggcrate grilles and/or louvre units square, straight and in 1 piece where possible or with inconspicuous joints at long runs.

3.2.20. Control Joints:

3.2.20.1. Provide pre-fabricated control joints prepared to suit Site conditions control joints and in accordance with manufacturer's instructions and in accordance with ASTM C840.

3.2.20.2. Set in gypsum facing board, supporting control joints with studs or furring channels on both sides of joint. Ensure double studs with discontinuous tracks and double suspended ceiling furring channels have been installed prior to commencing board and bead application at control joints. Provide control joints at following locations:

3.2.20.2.1. support construction changes.

3.2.20.2.2. partition, ceiling or furring runs exceed 9000 mm (30').

3.2.20.3. Provide control joints full height floor to ceiling or door header to ceiling in partitions and furring runs.

3.2.20.4. Provide control joints from wall to wall in ceiling areas.

3.2.20.5. Provide continuous polyethylene dust barrier behind and across control joints.

3.2.20.6. Obtain the Consultant's acceptance of exact locations of control joints.

3.2.21. Sound Control:

3.2.21.1. Where indicated on the Drawings, provide sound rated partitions and ceiling in locations

indicated to meet required minimum STC rating. Apply gypsum board on both sides of sound-proofed partitions. Follow manufacturer's details and recommendations.

- 3.2.21.2. Provide sound attenuation insulation to completely fill height of stud cavities. Tightly butt ends and sides of blankets within cavities. Cut blankets to fit small spaces. Carefully fit blankets behind electrical outlets, bracing, fixture attachments and mechanical and electrical services.
- 3.2.21.3. Mechanically fasten blankets to back of gypsum board as recommended by gypsum board manufacturer.
- 3.2.21.4. At sound attenuating suspended ceiling and enclosures having spring isolator hangers, terminate ceiling or enclosure at adjacent construction by providing continuous isolator strip and sealed joint.

3.2.22. Joint Treatment - Gypsum Board:

- 3.2.22.1. Verify board is firm against framing members and screw heads are properly depressed.
- 3.2.22.2. Mix joint compound or ready-to-use compounds according to manufacturer's directions. Use pure, unadulterated, clean water for mixing. Permit mixed material to stand 30 minutes before using. Do not mix more material than can be used within 1 hour. Do not use set or hardened compound. Clean tools and equipment after mixing each batch.
- 3.2.22.3. Tape and fill joints and corners in accordance with gypsum board manufacturer's printed instructions. Fill either manually, using hand tools of trade, or by a mechanical taping and filling machine of proven efficiency.
- 3.2.22.4. Remove plastic tape from control joints after finishing with joint compound.
- 3.2.22.5. After final coats of filler have dried at least 24 hours, sand surface lightly with No. 00 sandpaper to leave it smooth, ready for decoration.
- 3.2.22.6. Provide finished work smooth, seamless, plumb and true, flush and with square plumb neat corners.
- 3.2.22.7. Levels of Finish: Provide following levels of finish in accordance with ASTM C840:
 - 3.2.22.7.1. Level 0: No taping, finishing or accessories required for temporary construction or areas where final decoration is not required.
 - 3.2.22.7.2. Level 1: Use this level in plenum areas above ceilings, attics, areas where assembly would generally be concealed or in building service corridors and other areas.
 - 3.2.22.7.3. Level 2: Use this level where water resistant gypsum backing board is used as substrate for tile; may be used in garages, warehouse storage, or other similar areas where surface appearance is not of primary concern.
 - 3.2.22.7.4. Level 3: Use this level in appearance areas which are to receive heavy or medium texture spray or hand applied finishes before final painting or where heavy grade wall coverings are to be applied as final decoration.
 - 3.2.22.7.5. Level 4: Use this level where flat paints, light textures or wall coverings are to be applied.
 - 3.2.22.7.6. Level 5: Use this level to provide a uniform surface and minimize possibility of joint photographing and of fasteners showing through final decoration.

- 3.2.22.7.7. Exposed Moisture Resistant Gypsum Board Finish: Ensure joints and interior angles have tape embedded in joint compound and 2 separate coats of joint compound applied over all flat joints and 1 separate coat of joint compound applied over interior angles. Cover fasteners heads and accessories with 3 separate coats of joint compound. Ensure surface is smooth and free of tool marks and ridges.

- 3.2.23. Cutting and Patching: Cooperate and coordinate with the work of other Sections to obtain satisfactory gypsum board finish work. Do cutting, patching and Make Good as required by installation of the work of other Sections.

3.3. SITE QUALITY CONTROL

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

3.4. CLEANING

- 3.4.1. Clean off beads, casings, joint cement droppings and similar items and remove surplus materials and rubbish on completion and as directed.

3.5. PROTECTION

- 3.5.1. Provide protection of materials and work of this Section from damage by weather and other causes. Perform work in areas closed and protected from damage due to weather. Protect work of other trades from damage resulting from the work of this Section. Make Good such damage immediately.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide tiling including but not limited to the following:

- 1.2.1.1. grouting control joints in floor slab under tile.
- 1.2.1.2. waterproofing membrane.
- 1.2.1.3. levelling bed.
- 1.2.1.4. fast-setting cement leveling bed for interior floors.
- 1.2.1.5. CIM for both floors and walls.
- 1.2.1.6. thin-set mortar bond coat.
- 1.2.1.7. fast-setting thin-set mortar bond coat.
- 1.2.1.8. floor tile, base and fittings.
- 1.2.1.9. wall tile.
- 1.2.1.10. caulking tile control joints.
- 1.2.1.11. caulking penetrations through wall and floor tile.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:

- 1.3.1.1. CIM: Crack Isolation Membrane.
- 1.3.1.2. EGP: Exterior Grade Plywood.
- 1.3.1.3. MSDS: Material Safety Data Sheets.
- 1.3.1.4. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
- 1.3.1.5. TTMAC: Terrazzo, Tile & Marble Association of Canada; www.ttmac.com.
- 1.3.1.6. VOC: Volatile Organic Compound.
- 1.3.1.7. WHMIS: Workplace Hazardous Materials Information System.

- 1.3.2. Reference Standards:

- 1.3.2.1. ANSI A108.6-99(05) - Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy

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|-----------|----------------------|--|
| 1.3.2.2. | ANSI A108.8-99(05) | - Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout |
| 1.3.2.3. | ANSI A108.10-99 (05) | - Installation of Grout in Tilework |
| 1.3.2.4. | ANSI A118.1-08 | - American National Standard Specifications for Dry-Set Portland Cement Mortar |
| 1.3.2.5. | ANSI A118.3-08 | - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive |
| 1.3.2.6. | ANSI A118.4-08 | - American National Standard Specifications for Latex-Portland Cement Mortar |
| 1.3.2.7. | ANSI A118.5-08 | - American National Standard Specifications for Chemical Resistant Furan Mortars and Grouts for Tile Installation |
| 1.3.2.8. | ANSI A118.6-08 | - American National Standard Specifications for Standard Ceramic Grouts for Tile Installation |
| 1.3.2.9. | ANSI A118.7-08 | - American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation |
| 1.3.2.10. | ANSI A118.10-08 | - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation |
| 1.3.2.11. | ANSI A118.11-99(05) | - American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar |
| 1.3.2.12. | ANSI A118.12-08 | - American National Standard Specification for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation |
| 1.3.2.13. | ANSI A136.1-08 | - American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile |
| 1.3.2.14. | ANSI A137.1-08 | - Specification for Ceramic Tile |
| 1.3.2.15. | ASTM A185/A185M-07 | - Specification for Steel Welded Wire Reinforcement, Plain, for Concrete |
| 1.3.2.16. | ASTM C144-04 | - Specification for Aggregate for Masonry Mortar |
| 1.3.2.17. | ASTM C207-06 | - Specification for Hydrated Lime for Masonry Purposes |
| 1.3.2.18. | ASTM C373-88(06) | - Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products |
| 1.3.2.19. | ASTM C503-08 | - Specification for Marble Dimension Stone (Exterior) |
| 1.3.2.20. | ASTM C627-93(99) | - Standard Method of Evaluating Ceramic Floor Tile Systems using the Robinson-Type Floor Tester |
| 1.3.2.21. | ASTM C648-04a | - Specification for Standard Test Method for Breaking Strength of Ceramic Tile |
| 1.3.2.22. | ASTM C650-04 | - Test Method for Resistance of Ceramic Tile to Chemical Substances |

- 1.3.2.23. ASTM C847-06 - Specification for Metal Lath
- 1.3.2.24. ASTM F1869-04 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- 1.3.2.25. CAN/CGSB-51.34-M86 - Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- 1.3.2.26. CSA A3000-08 - Cementitious Materials Compendium
- 1.3.2.27. CSA A123.3-05 - Asphalt Saturated Organic Roofing Felt
- 1.3.2.28. CSA A23.1-04 - Concrete Materials and Methods of Concrete Construction
- 1.3.2.29. ISO 13006:1998 - International Standard – Ceramic Tiles - Definitions, classification, characteristics and marking
- 1.3.2.30. ISO 10545-7:1996 - International Standard - Ceramic Tiles – Part 7: Determination of resistance to surface abrasion for glazed tiles
- 1.3.2.31. ISO 13007-1:2004 - International Standard - Ceramic tiles - Grouts and adhesives – Part 1: Terms, definitions and specifications for adhesives
- 1.3.2.32. ISO 13007-3:2004 - International Standard - Ceramic tiles - Grouts and adhesives – Part 3: Terms, definitions and specifications for grouts

1.4. ADMINISTRATIVE REQUIREMENTS

- 1.4.1. Pre-installation Meetings: Arrange pre-installation meeting 1 week prior to commencing work with Subcontractors as designated in the Contract Documents or as requested by the Consultant. Presided over by the Contractor, include the Consultant who may attend, Subcontractor performing work of this trade, drywall trade, testing company's representative and consultants of applicable discipline. Review the Contract Documents for the work included under this Section and determine complete understanding of requirements and responsibilities relative to the work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, the Contract staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of the work of this Section.

1.5. SUBMITTALS

- 1.5.1. Product Data:
 - 1.5.1.1. Submit manufacturer's technical data sheets, WHMIS, MSDS and installation instructions for specified materials.
 - 1.5.1.2. Where more than 1 manufacturer's Products are part of single tile assembly, arrange for each manufacturer to submit a written statement of compatibility with respect to other manufacturer's materials.
- 1.5.2. Shop Drawings: Submit Shop Drawings for the work of this Section in accordance with Section 01 30 00 – Administrative Requirements. In addition to minimum requirements indicate following:
 - 1.5.2.1. details of construction.
 - 1.5.2.2. joint layouts.
 - 1.5.2.3. dimensions.
 - 1.5.2.4. patterns.

1.5.2.5. markings.

1.5.2.6. lettering.

- 1.5.3. Samples: Submit samples in accordance with Section 01 30 00 – Administrative Requirements. Submit individual sample panels of each colour of ceramic tile, set with adhesive, grouting and bonding method as specified, showing quality, colour and finish of material, grout and pattern of tiles. Ensure each panel is minimum 600 mm x 600 mm (24" x 24").

1.6. CLOSEOUT SUBMITTALS

- 1.6.1. Operational and Maintenance Data: Submit maintenance instructions in accordance with Section 01 70 00 – Execution and Closeout Requirements. Provide the Owner with 3 copies of TTMAC's "2000 Maintenance Guide". Include specific warnings of any maintenance practice or materials which may damage or disfigure tile work.

1.7. MAINTENANCE MATERIAL SUBMITTALS

- 1.7.1. Extra Stock Materials:

1.7.1.1. Supply in addition to quantities required for Work, extra materials and Products to be stored by the Region as follows:

1.7.1.1.1. Provide 20 extra tiles of each type of tile and special units.

1.7.1.2. Deliver extra stock to the Owner as soon as permanent, locking storage facilities are available. Place extra stock in designated storage area where directed.

1.8. QUALITY ASSURANCE

- 1.8.1. Qualifications:

1.8.1.1. Manufacturers: Provide Product of company specializing in manufacture of ceramic tile, porcelain tile, mosaics, pavers, trim units, thresholds, setting, grouting and installation Products with a minimum experience of 5 years. Provide test reports if requested to substantiate that Products supplied on this Contract will be of consistent quality in appearance and physical properties.

1.8.1.2. Installers: Execute the work of this Section using a company who is a member in good standing with TTMAC and has a minimum of 5 years successful experience in application of Products, systems and assemblies specified. Perform tile work using skilled mechanics trained and experienced in work of this complexity. Install waterproofing system using an applicator approved by system manufacturer.

1.9. DELIVERY, STORAGE AND HANDLING

- 1.9.1. Delivery and Acceptance Requirements:

1.9.1.1. Coordinate deliveries to comply with construction progress schedule and arrange for above ground, under cover storage before materials are delivered to Site.

1.9.1.2. Deliver tile in a manner to avoid chipping, breakage, staining and any other damage.

1.9.1.3. Deliver packaged materials in their original bags and containers clearly identified.

- 1.9.2. Storage and Handling Requirements:

1.9.2.1. Store and handle tile in a manner to avoid chipping, breakage, staining and any other damage.

- 1.9.2.2. Store packaged materials in their original bags and containers clearly identified. Keep containers sealed and labels intact until time of use. Prevent damage or contamination to materials by water, moisture, freezing, excessive heat, foreign matter or other causes. If materials have frozen, do not stir liquids or mix materials until they are completely thawed.
- 1.9.2.3. Provide secure heated and dry storage facilities on Site. Maintain temperatures in storage area between 15 deg C (59 deg F) and 30 deg C (86 deg F).

1.10. SITE CONDITIONS

1.10.1. Ambient Conditions:

- 1.10.1.1. Do not perform the work of this Section at temperature below 12 deg C (54 deg F) when using portland cement mortars or dry set mortars, latex portland mortars or bond coat. Maintain temperature between 12 deg C (54 deg F) and 32 deg C (90 deg F).
- 1.10.1.2. Observe manufacturer's recommended working temperatures for installation of adhesives and grouts.
- 1.10.1.3. Close doors and windows and turn off direct forced ventilation systems and apparatus. Turn off radiant floor heating systems and protect work area from direct draft, sun and heat exposure during installation and for at least 72 hours after completion.
- 1.10.1.4. Do not perform work of this Section when either substrate and/or ambient temperatures are below 10 deg C (50 deg F) or above 35 deg C (95 deg F). Maintain temperature in tiled areas within these temperature limits during installation and for 7 Days after completion of the Work unless otherwise indicated in the Product instructions and/or in ANSI A108 Installation Standard Procedure requirements.

1.11. WARRANTY

1.11.1. Manufacturer Warranty:

- 1.11.1.1. Warrant the work of this Section for a period of 3 years against defects, excessive wear and loss of adhesion including replacement of defective tiling, materials, labour costs for demolition of defective work, accessories and installation systems at Owner's convenience. Cracks arising from normal shrinkage and/or expansion of concrete are not considered as structural failure. Hairline cracks in grout joints which result from these causes are considered normal and warranty is not voided as a result of these minor defects.
- 1.11.1.2. Warrant waterproofing work of this Section against defects of workmanship and materials and against any actual leakage, for a period of 5 years. Leakage due to structural failure of concrete is excepted.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of the following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:

- 2.1.1.1. Custom Building Products; www.custombuildingproducts.com
- 2.1.1.2. Flextile Ltd.; www.flextile.net
- 2.1.1.3. Laticrete International, Inc.; www.laticrete.com
- 2.1.1.4. Mapei Corporation; www.mapei.ca

2.1.1.5. Olympiatile + Stone: www.olympiatile.com

2.1.1.6 Equivalent

2.1.2. Use proprietary Products in full compliance with the manufacturer's recommendations. As far as possible obtain Product from single manufacturer ensuring compatibility with adjacent components while maintaining quality.

2.2. MATERIALS

2.2.1. Description:

2.2.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review as required in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851. Refer to Section 01 40 00 – Quality Requirements for further requirements.

2.2.2. CIM: Provide 1 of following:

2.2.2.1. Two part system made up of liquid rubber and reinforcing fabric to provide crack bridging capability over non-structural cracks, compatible with thin set mortar, supply "Laticrete Blue 92" by Laticrete International, Inc., "WP-980 Waterproof & Crack Isolation Membrane", "1000 – Flexilastic Crack Isolation and Sound Reduction Membrane" by Flextile Ltd. or Equivalent.

2.2.2.2. Single component highly flexible load bearing peel and stick sheet membrane and primer compatible with tile/stone setting mortars, supply "Mapeguard Primer and Mapeguard SM" by Mapei Corporation, or Equivalent.

2.2.3. Waterproofing Membrane: Provide 1 of following:

2.2.3.1. Extra heavy duty, seamless, load bearing conforming to ANSI A118.10, for installation of ceramic tile and quarry tile for areas such as bathrooms, plazas, showers, kitchens, fountains, swimming pools and balconies: "Flextile WP-980 Waterproof & Crack Isolation Membrane with Reinforcing Fabric" by Flextile Ltd., "Latacrete 9235" waterproof membrane system with Latacrete's fiberglass cloth reinforcement by Laticrete International, Inc., "Mapelastic™ 315" by Mapei Corporation or Equivalent.

2.2.3.2. A single component self-curing liquid rubber polymer that forms a flexible, seamless waterproofing membrane; provide "Hydro Ban" by Laticrete International, Inc., "Aqua Defense" by Mapei Corporation or Equivalent.

2.2.4. Adhesive and Mortar Materials:

2.2.4.1. Latex Mortar Bond Coat: ISO 13007-1 performance level (C2ES2P2); ANSI A118.4; ANSI A118.11; for improved (C2) cement adhesive with (E) extended open time (S2) high-deformability (>5 mm) and improved (P2) for adherence to EGP characteristics, conforming to ANSI A118.4 and ANSI A118.11 requirements, supply "Laticrete 4237 with Portland Filler Powder" by Laticrete International, Inc., "Kerabond/Keralastic" by Mapei Corporation, "#51 Floor and Wall Mix Thin-Set Mortar" and "#44 High Solids Latex Thin-Set Mortar Additive" by Flextile Ltd., or Equivalent.

2.2.4.2. Enriched, modified Portland cement thin bed mortar, single component, with polymer, conforming to ANSI A118.4 and ANSI A118.11 requirements, supply "Flextile 52" by Flextile Ltd., "254 Platinum Multipurpose Thin Set-Mortar" by Laticrete, "Ultraflex 3" or "Ultraflex RS" by Mapei Corporation, or Equivalent.

2.2.5. Grout Materials:

2.2.5.1. Epoxy grout, commercial grade, conforming to ANSI A118.3, for joints greater than 1.5 mm (1/16") and less than 12.7 (1/2"), low VOC, non-toxic, non-flammable, non-hazardous during storage, chemically and stain resistant, supply "Flex-Epoxy 100 Grout" by Flextile, "SpectraLOCK PRO Grout" by Laticrete, "Kerapoxy" by Mapei Corporation, or Equivalent.

2.2.5.2. Grout colours to be later selected by the Consultant from manufacturer's full range of colours.

2.2.5.3. Grout sealer: as recommended by grout manufacturer.

2.2.6. Porcelain Tile:

2.2.6.1. Floor Tile Type (PT1): Supply 600 mm x 1200 mm x 9mm unglazed porcelain tile "Portland Stone Veincut Lead" by Stonetile

2.2.6.2. Wall Tile Type (PT2): Supply 600 mm x 1200 mm x 9mm unglazed porcelain tile "Portland Stone Veincut Talc by Stonetile

2.2.7. N/A

2.2.8. Grout:

2.2.8.1. Industrial Grade 100% Solids Epoxy Grout: Conforming to ANSI A118.3 and ISO 13007-3 (RG) performance levels for reactive resin grouts, 100% solids, industrial-grade 2 component (RG) reactive epoxy resin grout "Kerapoxy® IEG System" by Mapei Corporation or Equivalent. Colour to architect's later selection from standard colours available.

2.2.9. Transition Strips and Reducer Strips: Custom made metal extrusion; 3mm wide stainless steel strip separating tile from adjacent differing materials.

2.2.10. Metal Separation Strips: Shall be stainless steel Schluter or Equivalent, 3mm thick separation strips between porcelain tiles, carpet and vinyl plank flooring.

PART 3 - EXECUTION

3.1. EXAMINATION

3.1.1. Verification of Conditions:

3.1.1.1. Verify existing conditions and finishes are ready to receive specified tile work. Ensure backings are structurally sound, level, and plumb within required tolerances. Notify Consultant in writing of unacceptable substrate conditions.

3.1.1.2. Ensure compatibility of adhesives, waterproofing, reinforcing and fillers with adjacent substrate and component coming in contact with these Products.

3.1.1.3. Ensure waterproofing and adhesive manufacturers; examine substrate conditions, verify conditions are suitable for installation prior to commencement and review application procedures. If requested submit written report.

- 3.1.2. Pre-installation Testing: Perform calcium chloride test in accordance with requirements of ASTM F1869 immediately prior to tiling for moisture on concrete floors around perimeter of areas, at columns and where moisture may be anticipated. Conduct 3 tests for first 93 m² (1000 sq ft) and 1 additional test for every 93 m² (1000 sq ft) of flooring. Ensure moisture emission from concrete floor does not exceed 1.36 kg/93 m² (3 lbs/1000 sq ft) in 24 hours unless otherwise stated in flooring Product instructions and limitations. Do not proceed with installation until moisture problem has been corrected. Provide results to the Consultant prior to commencement of installation.
- 3.1.3. Evaluation and Assessment:
 - 3.1.3.1. Prior to installation, set aside for further inspection and replacement on a tile for tile basis by tile or dimension stone supplier, sub-standard tiles, fractured tiles or tiles with chipped corners, pinholes or voids that are unusable for cuts. Ensure that Subcontractor responsible for the work of this Section replaces at its own expense, sub-standard and/or pre-damaged tiles once installed.
 - 3.1.3.2. Carefully select, set-aside and shade-mix tiles and/or dimension stones to a homogeneous blend throughout. During installation, provide supplementary lighting equipment if necessary to easily identify shade differences, which could normally be very slight and provide a standard even aesthetic blend effect. This is best achieved by using a strong floodlight or spotlight fitted to a movable pole stand immediately over the Work area.
 - 3.1.3.3. Before setting, examine tile backs for possible dust or other contaminants. If necessary, use a slightly damp towel and wipe tile backs to remove any such dust or contaminant residue.
 - 3.1.3.4. Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

- 3.2.1. Surface Preparation:
 - 3.2.1.1. Ensure substrates are structurally sound, solid, stable, level, plumb and true to a tolerance in plane of 6 mm in 3 m (1/4" in 10' - 0") in accordance with ANSI A108 specification requirements. Ensure substrates are clean and free of dust, oil, grease, paint, tar, wax, curing agent, primer, sealer, form release agent or any deleterious substance and debris which may prevent or reduce adhesion.
 - 3.2.1.2. Mechanically sand, shot blast or scarify substrate as required to completely remove paint, loosely bonded topping, loose particles and contaminants. Surface etching or contaminant removal by chemical means is not permitted. When sanding or scarifying surfaces that may contain silica sand, wear an approved dust mask.
 - 3.2.1.3. Apply latex cementitious leveling coat to correct substrate irregularity up to 8 mm (5/16") thickness. Above 8 mm (5/16") correct irregularity by mortar bed method or fast-setting mortar bed method.
 - 3.2.1.4. Ensure substrates are dry.
 - 3.2.1.5. In all cases, structural design of substrate shall not allow a deflection greater than L/360 when tested to 136 kg (300 lb) concentrated loads in accordance with ASTM C627 test method. Deflection and curvature should be uniform over length of the span.
 - 3.2.1.6. Review setting out point with the Consultant for each location, verify patterns and edge condition.
 - 3.2.1.7. Verify substrate expansion joints have been installed properly.

3.3. INSTALLATION

- 3.3.1. Provide tiling in accordance with TTMAC's "Specification Guide 09 30 00 Tile Installation Manual 2006-2007" unless specified otherwise in the Contract Documents.
- 3.3.2. Lay out tile so field or patterns are centered on wall and floor areas, or conform architectural details so no tile less than 1/2 size occurs. No cut tiles are allowed at finished ceiling level. Align joints in walls, bases and floors, where tile sizes accommodate. Provide uniform joint widths throughout.
- 3.3.3. Prior to installation ensure back of each tile is free of contaminants. Distribute production run variations evenly, maintaining continuity of appearance. When necessary, wipe the back face of stone or tile with a damp towel or cloth to remove dust and residual contaminants.
- 3.3.4. Arrange accessories in tile work so they are spaced evenly, centered with joints and set true with proper and adequate projection conforming to the manufacturer's recommendations.
- 3.3.5. Make sure tile has adequate solid backing. Ensure corner and edges are fully supported by bonding material. Avoid slippage. Ensure tile installation has a minimum of 95% bond coverage by back-buttering or other approved technique.
- 3.3.6. Fit tile units around corners, fittings, fixtures, drains and other built-in-objects to maintain uniform joint appearance. Cut, drill and set anchors, bolts for fastening fixtures and fittings in tile work. Make cut edges smooth, even and free from chipping. Do not split tile.
- 3.3.7. Grout to match colour of tile unless indicated otherwise. Fill joints.
- 3.3.8. Expansion and Control Joints:
 - 3.3.8.1. Carry existing movement joints all the way through from substrate surface layer including tiling surface. Ensure control and expansion joints are kept free of setting materials.
 - 3.3.8.2. Install control joints where tiling abuts restraining surfaces, around perimeter of work (and or panel) and at base of columns and curbs.
 - 3.3.8.3. Install and space expansion and control joints in accordance with following:
 - 3.3.8.3.1. interior: 4878 mm (16') to 6098 mm (20') in each direction with minimum joint width of 6 mm (1/4").
 - 3.3.8.3.2. interior exposed to direct sunlight or moisture: 2439 mm (8') to 3659 mm (12') in each direction with minimum joint width of 6 mm (1/4").
 - 3.3.8.3.3. exterior - normal: 2439 mm (8') to 3659 mm (12') in each direction with minimum joint width of 9 mm (3/8").
 - 3.3.8.3.4. exterior - excessive: 2439 mm (8') to 3049 mm (10') in each direction with minimum joint width of 13 mm (1/2").
 - 3.3.8.4. Caution: Under no circumstances cut in control joints after tiling has been installed. Install tiling up to movement joint and stop. If required, cut tiling and resume setting from opposite side of the joint. Before continuing, rake joint clean.
 - 3.3.8.5. Install an approved compressible bead and specified sealant to caulk expansion and control joints. Follow sealant manufacturer's installation instructions or install preformed proprietary brand control joint profiles as specified in the Contract Documents.

3.3.9. Ceramic Tile:

- 3.3.9.1. Provide setting bed in accordance with manufacturer's printed instructions and as specified herein.
- 3.3.9.2. Prepare gypsum board and cement board surfaces, by applying a scratch coat of setting bed material.
- 3.3.9.3. Provide setting compound in 1 layer with notched trowel to provide a continuous 3 mm to 6 mm (1/8" to 1/4") bed, in accordance with tile manufacturer's written instructions.
- 3.3.9.4. Place tiles to achieve uniform:
 - 3.3.9.4.1. shading.
 - 3.3.9.4.2. colouring.
 - 3.3.9.4.3. jointing.
- 3.3.9.5. Lay tiles in true lines, conforming to lines of building and arrange symmetrically in accordance with the Drawing layouts. Review layout and slopes with the Consultant prior to setting of tiles.
- 3.3.9.6. Lay out work to produce a symmetrical pattern with minimum amount of cutting. Ensure to cut tiles at room perimeter is not less than 1/2 full size.
- 3.3.9.7. Provide slopes to floor drains using levelling bed material.
- 3.3.9.8. Set wall tile in a true vertical plane with edges of tiles flush with each other.
- 3.3.9.9. Set floor tile flat and level, with uniform joints throughout, properly aligned. Provide uniform slopes to floor drains.
- 3.3.9.10. Neatly and closely fit tiles around pipes, accessories and other items occurring in floor and walls. Provide necessary cutting without marring tile.
- 3.3.9.11. Replace cracked, discoloured, chipped and damaged tile.
- 3.3.9.12. Align joints of floor, wall and base tiles.

3.3.10. Grouting:

- 3.3.10.1. Where tiling is installed with normal setting thin-set mortar, grout no sooner than 24 hours after installation.
- 3.3.10.2. Where tiling is installed with fast-setting mortar system, grout no sooner than 3 to 4 hours after installation.
- 3.3.10.3. Where tiling or stone tiling is installed with reactive epoxy mortars and adhesives, grout no sooner than 24 hours after installation.
- 3.3.10.4. Where tiling or stone tiling is installed with reactive polyurethane adhesive, grout no sooner than 24 hours after installation.
- 3.3.10.5. Install epoxy grouts in accordance with Product instructions and ANSI A108.6.
- 3.3.10.6. Install unsanded cement grout in accordance with Product instructions and ANSI A108.10.
- 3.3.10.7. Install sanded cement grout in accordance with Product instructions and ANSI A108.10.

3.4. SITE QUALITY CONTROL

- 3.4.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.
- 3.4.2. Manufacturer Services: Have manufacturer's representative visit Site at commencement of tile work to give proper direction and thereafter at regular intervals to ensure proper workmanship.

3.5. CLEANING

- 3.5.1. Remove grout and mortar residue immediately while work progresses and before materials harden on tiling surface.
- 3.5.2. Clean tiling completely leaving no apparent cement laitance on the surface. Do not acid wash especially where pigmented grouts are specified.
- 3.5.3. Clean adjacent surfaces that have been soiled or otherwise marred, to completely remove evidence of materials causing same.
- 3.5.4. Upon completion, remove protective coverings and clean down finished work of this Section leaving it in a correct condition according to industry standards. Correct defective jointing and grouting and other non-conformities.

3.6. PROTECTION

- 3.6.1. Protect other parts of work from spatters, stains or damage.
- 3.6.2. Remove and replace with new materials, sections of work that have become stained, soiled, broken, chipped or otherwise damaged.
- 3.6.3. Protect finished work from weather, freezing and complete water immersion for periods of at least 72 hours to 14 Days after completion of the Work depending on setting and grouting materials used. Follow Product instructions for requirements.
- 3.6.4. Walls: Protect walls from impact, vibration and hammering on adjacent and opposite walls for periods of at least 24 hours to 7 Days after installation depending on setting and grouting materials used. Follow Product instructions for requirements.
- 3.6.5. Floors: Protect floors from foot traffic for at least 4 hours to 48 hours after installation depending on the setting and grouting materials used. In all cases prohibit heavy commercial and equipment traffic for at least 48 hours to 7 Days depending on setting and grouting materials used. Follow product instructions for requirements.
- 3.6.6. Fabricated Faced Panels: Do not disturb or move panels for at least 7 Days or 72 hours with fast-setting mortar system and allow setting mortar to cure for at least 7 Days to 28 Days before shipping and installing panels on Site depending on setting and grouting materials used. Follow product instructions for requirements.
- 3.6.7. Since temperature and humidity conditions during and after installation affect final curing time of cement based and epoxy materials, allow for extended periods of cure and protection when ambient and/or substrate temperatures drop below 15 deg C (60 deg F) and/or when relative humidity is higher than 70%.
- 3.6.8. Protect finished work from damage by the work of other Sections and general abuse until Substantial Performance of the Contract and acceptance.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide acoustic tile ceilings including but not limited to following:
- 1.2.1.1. ceiling suspension systems.
 - 1.2.1.2. lay-in acoustic ceiling panels.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Provision of suspended gypsum board ceilings: Section 09 21 16 - Gypsum Board.
 - 1.2.2.2. Provision of electrical, communication and security fixtures: Division 26, Electrical, Division 27, Communications, Division 28, Electronic Safety and Security.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. STC: Sound Transmission Class.
 - 1.3.1.2. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
 - 1.3.1.3. cUL: Underwriters Laboratories Inc.; www.ul.com.
- 1.3.2. Reference Standards:
- 1.3.2.1. ASTM C635/C635M-07 - Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 - 1.3.2.2. ASTM C636/C636M-08 - Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
 - 1.3.2.3. CAN/CGSB-92.1-M89 - Sound Absorptive Prefabricated Acoustical Units
 - 1.3.2.4. CAN/ULC-S101-07 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
 - 1.3.2.5. CAN/ULC-S102-07 - Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
 - 1.3.2.6. CAN/ULC-S114-05 - Standard Method of Test for Determination of Non-Combustibility in Building Materials
 - 1.3.2.7. CAN/ULC-S702-97 - Standard for Mineral Fibre Thermal Insulation for Buildings

1.4. SUBMITTALS

- 1.4.1. Product Data: Submit Product data on ceiling grid system, acoustic tile and panels; clearly indicate specific items proposed for use if manufacturer's catalogues are submitted.
- 1.4.2. Shop Drawings: Submit Shop Drawings for the work of this Section in accordance with Section 01 30 00 – Administrative Requirements. In addition to minimum requirements indicate following:
 - 1.4.2.1. reflected plans of ceilings, joint pattern, position of suspension grids, methods of suspension and termination at walls, partitions, bulkheads, lighting fixtures and mechanical fixtures.
 - 1.4.2.2. Submit reflected ceiling plans detailed in measurement system (e.g. imperial or metric) to match the Drawings.
- 1.4.3. Samples: Submit samples in accordance with Section 01 30 00 – Administrative Requirements. Submit following samples in sizes indicated:
 - 1.4.3.1. Submit 300 mm (12") long samples of suspension system parts, including trim.
 - 1.4.3.2. Submit 300 mm x 300 mm (12" x 12") samples of acoustic panels.
- 1.4.4. Certificates:
 - 1.4.4.1. Submit independent test data and certificate confirming system meets or exceeds specified STC rating.
 - 1.4.4.2. Submit independent test data and design tables for each type of insert to be employed on this Contract for hanger supports.

1.5. CLOSEOUT SUBMITTALS

- 1.5.1. Operational and Maintenance Data: Submit maintenance instructions to the Owner for recommended cleaning materials and methods for panels and trim. Include precautions for use of and composition of cleaning materials detrimental to acoustic materials and trim.

1.6. MAINTENANCE MATERIAL SUBMITTALS

- 1.6.1. Spare Parts: provide 50 new of each type of ceiling panel specified for the Owner's future maintenance use. Supply spare panels from same production run as installed panels.

1.7. QUALITY ASSURANCE

- 1.7.1. Qualifications:
 - 1.7.1.1. Installers: Provide the work of this Section executed by competent installers with a minimum of 5 years' experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.8. DELIVERY, STORAGE AND HANDLING

- 1.8.1. Delivery and Acceptance Requirements: Deliver materials in original packages, containers and bundles, bearing brand and manufacturer's name and ULC or cUL labels.
- 1.8.2. Storage and Handling Requirements:
 - 1.8.2.1. Store materials in a covered area, off ground, on flat, smooth, dry surfaces. Protect from moisture. Remove damaged or deteriorated materials from Site.
 - 1.8.2.2. Comply with ceiling panel manufacturer's recommendations regarding temperature and

humidity conditions before, during and after ceiling installation.

1.9. SITE CONDITIONS

- 1.9.1. Ambient Conditions: Continuously maintain rooms or areas scheduled to receive acoustical treatment at not less than 21 deg C (70 deg F) and at occupancy humidity, at least 3 Days prior to installation and 3 Days after work is completed. Schedule work to eliminate risk of damage to these materials due to adverse environmental conditions in rooms or areas when and after work is installed.

1.10. WARRANTY

- 1.10.1. Manufacturer Warranty: Warrant work of this Section for period of 3 years against defects and/or deficiencies. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of the Consultant and at no expense to the Owner.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:

2.1.1.1. Armstrong World Industries Canada Ltd.; www.armstrong.com

2.1.1.2. CGC Industries; www.cgc.com

2.1.1.3. Equivalent

2.2. MATERIALS

- 2.2.1. Description:

2.2.1.1. Regulatory Requirements:

2.2.1.1.1. Pre-Start Health and Safety Review: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.

- 2.2.2. Performance/Design Criteria:

2.2.2.1. Design suspension system to support safely and without distortion, superimposed loads of:

2.2.2.1.1. Lighting fixtures.

2.2.2.1.2. Air supply diffusers, boots, fire alarm grilles and exhaust and return air grilles.

2.2.2.1.3. Power grid system, where indicated.

2.2.2.2. Design suspension system to support lighting fixtures according to Ontario Hydro regulations and submit certification in accordance with Rule 30-302 (1).

2.2.2.3. Prepare panels for sprinkler head penetrations.

2.2.2.4. Coordinate installation and cooperate with mechanical and electrical Subcontractors, to accommodate mechanical and electrical items, or any other work required to be incorporated in or coordinated with the ceiling system.

- 2.2.2.5. Whenever possible, acoustical ceiling tiles, steel suspension system and framing used in the work of this Section shall contain recycled content.
- 2.2.2.6. System Description: 0.85 NRC acoustical mineral fiber ceiling panel, square lay-in with t-bar grid system.
- 2.2.3. Acoustic Lay-in Panels: Conforming to CAN/CGSB-92.1-M, acoustical units, prefabricated, with white painted textured and/or smooth face, qualified for use in fire rated ceiling assembly; ULC or cUL labelled and meeting following performance criteria as determined by CAN/ULC-S101 and as specified:
 - 2.2.3.1. Flame Spread Rating: 25 or under.
 - 2.2.3.2. Smoke Developed: 50 or under.
 - 2.2.3.3. Fuel Contributed: 25 or under.
- 2.2.4. Acoustic Panels (ACT): To match existing. Ensure to inspect during mandatory GC pre-bid walk thru.
- 2.2.5. **Suspension System: “Optima PB Square Lay-in with Prelude 15/16” suspension system – white” by Armstrong World Industries**, or Equivalent, factory finished satin white on hot dipped galvanized cold rolled steel.
- 2.2.6. Basic Steel Material and Finish: Commercial quality cold rolled steel 0.455 mm (26 ga) minimum thickness, galvanized to zinc coating designation Z275 (G90). Ensure exposed surfaces of metal products are factory finished in non-yellowing, low sheen satin white enamel to Consultant's acceptance to match whiteness in panels. Provide paint formulation of grid system to lighting fixture, speaker grille, sprinkler and diffuser manufacturers to ensure consistency of colour, sheen and texture of all exposed metal components in the ceiling assemblies. Provide slip-on trim mouldings or metal mouldings with baked enamel finish, as standard with grid manufacturer, to trim around light fixtures.
- 2.2.7. Accessories for Suspension System: Complete with splices, clips and perimeter moulding of manufacturer's standard and aluminum types to suit the applicable conditions unless special conditions and access areas are shown or specified. In high humidity areas provide galvanized suspension system.
- 2.2.8. Hangers: Minimum 3.2 mm diameter to support 68 kg. per hanger, 4.0 mm diameter to support maximum weight of 138 kg. per hanger and 4.8 mm diameter to support a maximum weight of 250 kg. per hanger, zinc coated annealed steel wire to zinc coating designation Z275 (G90), meeting "Heavy-duty" classification of ASTM C635/C635M,
- 2.2.9. Hanger anchoring devices, expansion type eyebolt, T14 Eyebolt as manufactured Ramset, HCA 14 by Hilti Canada Ltd., Red Head TW-1614 anchors by Philips Drill Company, Division of ITT Industries of Canada Ltd, or Equivalent.
- 2.2.10. Hanger Isolators: Vibron VSK-1 or Equivalent to support the ceiling dead load with safety factor of 5.
- 2.2.11. Carrying Channels: 1.2 mm galvanized steel, 38 mm x 13 mm.
- 2.2.12. Wall Moulding Around Ceiling Perimeters: “Shadow Molding #7871” in White by Armstrong, or Equivalent, hemmed with prefinished exposed flanges.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify the actual Site dimensions and location of adjacent materials prior to commencing work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.

- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to panel manufacturer before installation is commenced. Maintain uniform temperatures of at least 21 deg C (72 deg F) for 72 hours prior to commencement of work and maintain temperature until 72 hours after completion.
- 3.2.2. Install ceiling panels and metal suspension system in accordance with applicable requirements of ASTM C636/C636M and manufacturer's directions. Where manufacturer's directions are at variance with the Contract Documents, notify the Consultant before proceeding with work.
- 3.2.3. Do not commence installation until all work above suspended ceiling has been completed, inspected and accepted.
- 3.2.4. Install supporting inserts for hangers of suspended ceiling system into concrete slab above.
- 3.2.5. Install acoustic ceilings using tradesmen skilled in this class of work, in accordance with manufacturer's instructions and as specified herein.
- 3.2.6. Neatly and symmetrically install suspended ceiling to true lines, evenly balanced to pattern indicated on the Drawings or as directed.
- 3.2.7. Centre ceiling system on room axis unless otherwise leaving equal border panels not less than 1/2 a full width.
- 3.2.8. Recessed items shall replace or be centered on acoustical panels, except where shown otherwise on the Drawings Consult with Subcontractors for mechanical and electrical Divisions to co-ordinate work. Provide additional supports where required.
- 3.2.9. Space hangers for suspended ceilings shall support grillage independent of walls, columns, pipes and ducts at maximum 1220 mm (4') centres along support grillage and not more than 150 mm (6") from ends. Provide additional hangers at light fixtures and diffusers.
- 3.2.10. Attach hangers to inserts in overhead concrete slab. Bend top of hangers at right angles, turn down and securely fasten. Turn bottom of hangers upwards and securely wrap 3 times.
- 3.2.11. Suspension to Metal Deck: Punch lower part of metal deck with special puncher at required distances. Put hanger wire through holes, turn down, make a loop and securely wrap 3 times.
- 3.2.12. Provide written confirmations to Subcontractors performing work under Divisions 21, 22, 23, 26, 27 and 28, when requested by the Consultant, that suspended ceiling is capable of supporting additional weight of mechanical and electrical fixtures specified in Divisions 21, 22, 23, 26, 27 and 28.
- 3.2.13. Run main tees at right angles to length of light fixtures.
- 3.2.14. Space main tees 1220 mm (4') oc in 1 direction and securely tie to hangers.
- 3.2.15. Space cross tees 610 mm (2') oc at right angles to main tees and properly lock at intersections.
- 3.2.16. Level suspended systems with a maximum tolerance of 3 mm (1/8") over 3.66 m (12').
- 3.2.17. Use longest practical lengths of tees, furring and running channels to minimize joints. Make joints square, tight, flush and reinforced with concealed splines. Assemble framework to form a rigid and interlocking system.
- 3.2.18. Design suspension system to accommodate movement caused by thermal expansion or contraction.

- 3.2.19. Design and space hangers and carrying members to support entire ceiling system, including lighting fixtures, diffusers and equipment openings in locations indicated on the Drawings.
- 3.2.20. Use edge moulding where ceiling abutts vertical surface.
- 3.2.21. Use corner moulding along external edges at ceiling steps.
- 3.2.22. Exposed Grid Lay-in Panel Ceilings:
 - 3.2.22.1. Install direct-hung exposed grid lay-in acoustic panel ceilings where shown. Install main tees, cross tees and wall mouldings so bottom flanges are in flat, level plane at finish ceiling elevations. Arrange grid so opposite wall edge panels are of equal width but not less than 1/2 panel width and lay out and erect grid system to provide following panel pattern as shown:
 - 3.2.22.2. Install exposed ceiling grid per ASTM C636/C636M, reviewed Shop Drawings and specified in this Section.
 - 3.2.22.3. Erect main beams parallel to main wall and to each other; space uniformly at centres specified. Stop ends of main beams 13 mm (1/2") from walls allowing for expansion. Supply main beams in as long lengths as possible to minimize number of joints in a run. Join lengths of main beams together at hangers only; use special splice pieces. In ceilings having recessed lighting fixtures, modify grid framing to provide main beams along and parallel to both long sides of lighting fixtures; at each 300 mm (12") wide fixture, provide an additional main beam along the long side of fixture. At other items recessed in ceiling and designed shall be framed by main beams, provide additional main beams necessary. Rest ends of main beams on horizontal leg of wall mouldings.
 - 3.2.22.4. Support main beams with hangers along each run, spaced at not more than 1220 mm (48") centres; except in areas of steel framing, provide hangers at each intersection of main beam and framing. If ductwork or equipment located in ceiling plenum area interferes with hanger spacing, provide a trapeze or other arrangement reviewed by the Consultant to support main beams at proper spacing. Do not secure hangers to metal roof deck, ductwork, conduit, piping, equipment or support system for any of these. Provide an additional hanger at each corner of each opening to receive a recessed lighting fixture and each opening that has been framed by main beam members. Provide additional hangers at each diffuser, grille and other points of extra loading. Secure hangers to main beams to develop full strength of hangers and per manufacturer's published directions. Secure hangers to construction above per ASTM C636/C636M and following requirements:
 - 3.2.22.4.1. Exposed Concrete Slab: Use anchors, cast-in hanger wires or inserts, specifically designed for hanger use.
 - 3.2.22.4.2. Steel Beams: Use beam clips.
 - 3.2.22.4.3. Steel Joists: Wrap hanger wire around lower chord member.
 - 3.2.22.5. Install primary cross tees at right angles to main beam tees and space uniformly at centres specified. Join ends of cross tees to web of main beams with a positive interlock; except at light fixtures, secure members together with concealed steel clips and bolts. Install tees to produce fine-line joints between flanges of abutting members.
 - 3.2.22.6. Install secondary cross tees at right angles to primary tees and space uniformly at centres specified, and secure in a manner similar to primary tees.
 - 3.2.22.7. At locations where ceilings abut walls, columns and other vertical surfaces, install continuous wall moulding to trim ceiling edges. Install moulding with bottom horizontal leg at elevation required to support acoustic panel and to be flush with bottom flange of grid members, and with vertical leg concealed. Bolt mouldings to supporting construction at

610mm (24") on centres and within 150 mm (6") of end of each moulding piece. Provide tight, inconspicuous butt joints in moulding if several pieces are required in any 1 run.

3.3. SITE QUALITY CONTROL

- 3.3.1. Site Tests and Inspections: After interior finishing work has been substantially completed, or when directed by the Consultant, inspect acoustical treatment work.
- 3.3.2. Non-Conforming Work: Replace broken, chipped or damaged work, reset loose units or units out of place and touch up marred surfaces with matching paint.

3.4. CLEANING

- 3.4.1. Upon completion of Contract, acoustical treatment finished surfaces shall be clean and free from dirt and other markings and in good condition acceptable to the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide resilient flooring including but not limited to following:

- 1.2.1.1. underlayment.
- 1.2.1.2. rubber tile.
- 1.2.1.3. resilient base.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:

- 1.3.1.1. MSDS: Material Safety Data Sheets.
- 1.3.1.2. PVC: Polyvinyl Chloride.
- 1.3.1.3. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
- 1.3.1.4. VOC: Volatile Organic Compound.

- 1.3.2. Reference Standards:

- 1.3.2.1. ASTM F1066-04 - Standard Specification for Vinyl Composition Floor Tile
- 1.3.2.2. ASTM F1344-04 - Standard Specification for Rubber Floor Tile
- 1.3.2.3. ASTM F1861-08 - Standard Specification for Resilient Wall Base
- 1.3.2.4. ASTM F1869-04 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

1.4. SUBMITTALS

- 1.4.1. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00.
- 1.4.2. Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in sizes indicated

1.5. CLOSEOUT SUBMITTALS

- 1.5.1. Operational and Maintenance Data: Submit 3 copies of Product maintenance manual to the Consultant prior Substantial Performance of the Contract. Ensure manual contains specific maintenance recommendations and gives specific warning of any maintenance practice or materials which may damage or disfigure resilient flooring and bases.

1.6. MAINTENANCE MATERIAL SUBMITTALS

- 1.6.1. Extra Stock Materials: Leave 5% of total installation including any partially used cases of each colour of resilient tile installed, for Owner's future use. Label cartons as to contents and indicate areas where tiles were used.
 - 1.6.1.1. Supply 2440 mm (96") of each resilient accessories of each material and colour specified.

- 1.6.1.2. Supply 5% of all types and finishes of transition strips specified in the Contract Documents.

1.7. QUALITY ASSURANCE

1.7.1. Qualifications:

- 1.7.1.1. Installers: Provide the work of this Section executed by competent installers with a minimum of 5 years' experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.

1.8. DELIVERY, STORAGE AND HANDLING

- 1.8.1. Delivery and Acceptance Requirements: Deliver materials undamaged in original wrappings or containers, with manufacturer's labels and seals intact.

1.8.2. Storage and Handling Requirements:

- 1.8.2.1. Store materials undamaged in original wrappings or containers, with manufacturer's labels and seals intact. Store materials in a warm, dry area.
- 1.8.2.2. Prevent damage to materials during handling and storage. Stack material not over 2 cartons in height, nor in excess of allowable floor loading. Store materials on smooth surfaces only, in an area designated by the Consultant.

1.9. SITE CONDITIONS

1.9.1. Ambient Conditions:

- 1.9.1.1. Provide each flooring Product in accordance with manufacturer's recommended tolerances for:
 - 1.9.1.1.1. substrate moisture content.
 - 1.9.1.1.2. temperature and ventilation.
- 1.9.1.2. Do not provide flooring under ambient and surface temperatures less than 20 deg C (68 deg F) in any instance for 48 hours before, during and 7 Days after installation.

1.10. WARRANTY

- 1.10.1. Provide two (2) year warranty against manufacturing defects, excessive wear, discoloration, delamination, wrinkling, failure of adhesive, opening of seams, splitting or blistering commencing on date of Total Performance of the Work.
- 1.10.2. Warranty shall include the removal and replacement of any defective areas, disposal of defective material including moving and replacing of equipment, furniture and other such items to allow installation of replacement material.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Interface

2.1.1.2. Armstrong

2.1.1.3. Johnsonite

2.1.1.4. Equivalent

2.2. MATERIALS

2.2.1. Description:

2.2.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with the *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 for further requirements.

2.2.1.2. Characteristics: Interface Luxury Vinyl Tile (LVT)

2.2.1.2.1 Collection: Level Set Collection - Natural Woodgrains 4.5mm

2.2.1.2.2 Style Number: Colour Washed Maple A00211

2.2.1.2.3 Construction: heavy Commercial Luxury Vinyl Tile With Fiberglas

2.2.1.2.4 Class: Class III, Printed Vinyl Plank

2.2.1.2.5 Finish: Cermor

2.2.1.2.6 Actual Dimensions: 25cm wide x 1m long

2.2.1.2.7 Thickness: 4.5mm

2.2.1.2.8 Installation: Ashlar

2.2.1.2.9 Refer to interface installation specification at www.interface.com . Adhere to recommended adhesive relative to moisture limit and surface pH Limit specific to installation.

2.2.1.3. Characteristics: Armstrong Vinyl Composite Tile (VCT)

2.2.1.3.1 Collection: Standard Excelon Imperial Texture Item Number: 51883

2.2.1.3.2 Style Number: Dusty Miller

2.2.1.3.3 Construction: heavy Commercial Luxury Vinyl Tile With Fiberglas

2.2.1.3.4 Class: Class II through Pattern

2.2.1.3.5 Finish: Fast Start

2.2.1.3.6 Actual Dimensions: 12"x12" Tile

2.2.1.3.7 Thickness: 3.2mm

- 2.2.1.3.8 Installation: Non-Directional Monolithic Installation
- 2.2.1.3.9 Installation: Adhesives: S-515 Tile Strong, S-319 Roll Strong, S-1000, Flip® Spray
- 2.2.2. Provide Products free from blisters, cracks, chipped edges and corners, embedded foreign matter and other defects.
- 2.2.3. All materials under Work of this Section, including but not limited to, primers, and adhesives shall have low VOC content limits.
- 2.2.4. Concrete Moisture Emission Reducer: Provide "Flextech 300" by Flextile Ltd., or Equivalent.
- 2.2.5. Underlayment: Latex/cement/sand patching compound compatible with resilient flooring and associated adhesives; "Latax Filler, S-194" by Armstrong World Industries Canada Ltd., Ultra/Plan by Mapei Canada Inc., "Flextile Patch" by Flextile Ltd. or Equivalent, or if acceptable to Product manufacturer, hydraulic cement based self-levelling floor underlayment manufactured by Gemite Products Inc. or Equivalent.
- 2.2.6. Wall Base (RB): Johnsonite Wall Base Exhibit 4-1/4"/.25" thick. Colour: Charcoal.
- 2.2.7. Millwork resilient wall base shall extend 114 mm onto wall surface on all walls and millwork bases **except** where wall tiles have been applied. Millwork resilient wall base only applied to base where/if specified in the millwork details/drawings.
- 2.2.8. Primers and Adhesives: Waterproof, as required for surfaces involved as recommended and supplied by tile manufacturer used.
- 2.2.9. Separation Strips: To be stainless steel separation strips by Schluter or Equivalent between porcelain tile floor, vinyl plank flooring and carpet flooring, 3mm thick.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify the actual Site dimensions and location of adjacent materials prior to commencing work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Preinstallation Testing:
 - 3.1.2.1. Perform calcium chloride test through an independent testing organization in accordance with requirements of ASTM F1869 immediately prior to installation of resilient flooring for moisture on concrete floors around perimeter of areas, at columns and where moisture may be anticipated. Conduct 3 tests for first 93 m² (1000 sq ft) and 1 additional test for every 93 m² (1000 sq ft) of flooring. Ensure moisture emission from concrete floor does not exceed 1.36 kg/93 m² (3 lbs/1000 sq ft) in 24 hours unless otherwise stated in flooring Product instructions and limitations. Do not proceed with installation until moisture problem has been corrected. Provide results to the Consultant prior to commencement of installation.
 - 3.1.2.2. When concrete moisture emission is between 1.36 kg/93 m² (3 lbs/1000 sq ft) and 4.53 kg/93 m² (10 lbs/1000 sq ft) in 24 hours use concrete moisture emission reducer.
 - 3.1.2.3. Conduct pH test through an independent testing organization to ensure alkali salt residue is within the limitation acceptable to manufacturer and to avoid adhesive failure, discoloration, shrinkage and softening of the floor covering. If the pH results are higher than 10, report to

the Consultant or the Owner for investigation and remedial. Also refer to manufacturer for ways to neutralize floor prior to beginning of installation. Neutralize by sanding, vacuuming and/or by water plus mild sulfuric or sulfamic acid application as recommended by manufacturer. Retest to assure pH has been neutralized.

- 3.1.3. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

3.2.1. Surface Preparation:

- 3.2.1.1. Clean resilient flooring substrates free of loose and adhered material perfectly clean and in accordance with the resilient flooring manufacturer's instructions.
- 3.2.1.2. Perform bond test over floors where paint, varnish and other foreign agents are removed.
- 3.2.1.3. Ensure concrete substrates are dry after performing tests as specified herein before using methods recommended by resilient flooring and adhesive manufacturers and that they exhibit no alkalinity, carbonization, dusting or scaling.
- 3.2.1.4. Remove subfloor ridges and bumps to flush with adjacent subfloor.

3.2.1.5. Stripping:

- 3.2.1.5.1. Remove and dispose of existing resilient flooring. Remove existing adhesives and prepare substrate as recommended by resilient flooring manufacturer.
- 3.2.1.5.2. Test existing substrate for soundness and remove unsound substrates.

3.2.1.6. Underlayment:

- 3.2.1.6.1. Fill depressions, dished areas, low spots, voids, gaps, cracks, joints, holes and other substrate defects with underlayment, flat, even and flush with adjacent substrate.
- 3.2.1.6.2. Floor fills, toppings and underlayment shall have minimum compressive strength of 24 MPa (3500 psi). Do not install underlayment, leveler, patching and skim coat over expansion joints.
- 3.2.1.6.3. Provide underlayment to achieve a flat substrate to within the following tolerances:
 - 3.2.1.6.3.1. 3 mm (1/8") total maximum deviation +/- along a 3000 mm (10') straight edge applied omni-directionally over entire floor area.
- 3.2.1.6.4. Provide a flat, smooth 610 mm (24") wide underlayment strip at the junction of resilient flooring with other finish flooring materials for a flush transition at the meeting edge. Feather strip edges to conceal its perimeter.

3.3. INSTALLATION

- 3.3.1. Scribe resilient flooring materials accurately around floor outlets, pipes, drains and projections through the floor.
- 3.3.2. Scribe non-coved resilient flooring materials accurately around their perimeters including at walls, columns and kickspaces of architectural woodwork.
- ~~3.3.3. Locate junctions of dissimilar flooring between rooms (i.e. same material but different colour, or~~

different material) at door opening centrelines.

- 3.3.4. Provide resilient flooring flush with floor plates, cleanout covers and other fitments in the floor.
- 3.3.5. Do not provide resilient flooring beneath permanently concealed portions of work of Section 06 40 00 unless indicated otherwise.
- 3.3.7. Where vinyl flooring terminates at exterior doors with thresholds or transition trim, feather flooring as required to achieve maximum allowable distance of 3mm between flooring and top of threshold or transition trim. Extend vinyl flooring a minimum of 13 mm under threshold and apply sealant to perimeter of threshold.
- 3.3.9. Millwork Wall Finishing System:
 - 3.3.9.1. Provide resilient base to substrate surfaces in accordance with the manufacturer's recommendations.
 - 3.3.9.2. Apply adhesive evenly and continuously for full base adhesion and contact. Do not apply adhesive in a manner which promotes induced waviness in resilient base.
 - 3.3.9.3. Provide base in longest lengths possible with top and bottom edges installed straight and true. Provide preformed inside and outside corners.
 - 3.3.9.4. Provide resilient bases to walls, partitions, columns and items of architectural woodwork.
- 3.3.10. Reducing Strips: Protect exposed edges of resilient flooring, where finished and unfinished area adjoin, by means of reducing strips butting to and flush with finished surface of floor covering material.
- 3.3.11. Promptly remove and replace flooring showing bumps from underlying dirt, discolouration, excessive wear, shrinkage or adhesion failure. Remove and replace base showing shrinkage or adhesion failure.

3.4. CLEANING

- 3.4.1. Remove adhesive from surface of flooring as work progresses.
- 3.4.2. After vinyl composite tile floors have been cleaned and dried, apply 1 coat of wax of a type acceptable to Owner and polish to a hard surface with mechanical buffers. Do not wax sheet flooring.
- 3.4.3. Do not wash newly laid floor covering for minimum 7 Days after installation to allow adhesive to set and dry.

3.5. PROTECTION

- 3.5.1. Protect this work and work of other trades at all times.
- 3.5.2. Protect newly laid flooring from construction traffic for a period of 7 Days to allow flooring to bond firmly. Then thoroughly clean surfaces in accordance to manufacturer's directions using cleaners as recommended by material manufacturer.
- 3.5.3. Provide and maintain necessary protection of finished resilient flooring and bases. Replace damaged resilient flooring and bases with new materials without cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide carpet tile including but not limited to following:
- 1.2.1.1. Carpet tile.
 - 1.2.1.2. Rubber base. Refer to 09 65 00
 - 1.2.1.3. Resilient accessories.
 - 1.2.1.4. Metal edge strips.
- 1.2.2. Related Sections: the following description of work is included for reference only and shall not be presumed complete:
- 1.2.2.1. Supply of resilient base: Section 09 65 00 - Resilient Flooring.

1.3. REFERENCES

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. CRI: Carpet and Rug Institute; www.carpet-rug.com.
 - 1.3.1.2. MSDS: Material Safety Data Sheets.
 - 1.3.1.3. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
 - 1.3.1.4. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
 - 1.3.1.5. VOC: Volatile Organic Compound.
- 1.3.2. Reference Standards:
- 1.3.2.1. CAN/CGSB-4.129-93 - Carpet for Commercial Use
 - 1.3.2.2. CAN/ULC-S101-07 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
 - 1.3.2.3. CAN/ULC-S102.2-07 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies
- ### **1.4. SUBMITTALS**
- 1.4.1. Shop Drawings: Submit carpet tile layout drawings in accordance with Section 01 30 00 – Administrative Requirements. Do not install carpet tile until layout drawings have been approved.
- 1.4.2. Samples:
- 1.4.2.1. Prior to ordering carpet tile, submit samples of carpet tile and accessories to Consultant for approval, minimum 450 mm x 450 mm (18" x 18"), for each type and colour of carpet to be used.
 - 1.4.2.2. The Consultant may take random samples of carpet tiles as installation progresses for comparison with approved samples. If, in opinion of the Consultant, such samples fail to meet

standard of approved samples, remove tiles and replace with approved tiles as required at no cost to the Owner.

- 1.4.3. Operational and Test Reports: Submit test reports to show Product meets specifications.

1.5. CLOSEOUT SUBMITTALS

- 1.5.1. Operational and Maintenance Data: Submit maintenance instructions in triplicate for insertion in maintenance manuals in accordance with Section 01 30 00 – Administrative Requirements. Ensure instructions give specific warning of maintenance or cleaning practices or materials which may damage carpeting.

1.6. MAINTENANCE MATERIAL SUBMITTAL

- 1.6.1. Extra Stock Materials: Deliver to the Consultant and store where directed 5% of each colour selected suitably labelled in boxes. Identify Product name, colour, quantity and locations where used in the Contract (Room Name and Nos).

1.7. QUALITY ASSURANCE

- 1.7.1. Qualifications:
- 1.7.2. Installers: Provide work of this Section executed by competent installers with a minimum of 5 years' experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- 1.7.3. Mock-Ups: In area designated by the Consultant, provide sample installation of each colour of at least 9 m² (100 sq ft) showing colour matching. Make changes as required until approved. When approved, sample area represents minimum acceptable standard for work. Remove sample installation when directed unless sample area can be satisfactorily incorporated into Work.

1.8. DELIVERY, STORAGE AND HANDLING

- 1.8.1. Delivery and Acceptance Requirements: Deliver cartons of carpet tile to Site clearly tagged to show installation location.
- 1.8.2. Storage and Handling Requirements:
- 1.8.2.1. Store adhesive, carpet tapes and similar items in heated area maintained at minimum temperature of 10 deg C (50 deg F) or at such temperature as recommended by Product manufacturer.
- 1.8.2.2. Comply with adhesive and carpet tile manufacturer's directions for use of adhesive. Observe open time limits for adhesives and place lids on open cans when not being used. Under no circumstances contaminate or thin adhesives with water or solvents, unless specifically directed by manufacturer in writing.

1.9. SITE CONDITIONS

- 1.9.1. Ambient Conditions: Provide ventilation system in area to be carpeted to ensure adequate (min 1 air change each hour) extraction of VOC's and other contaminants. In occupied buildings, existing ventilation system may not be used for this purpose.

1.10. WARRANTY

- 1.10.1. Manufacturer Warranty: Warrant work of this Section for a period of 15 years against defects and/or deficiencies. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include but are not limited to; buckling, opening of seams, bond failure, extensive colour fading and loss of more than 10% of pile fibre in any area.

PART 2 - PRODUCTS

2.1. MATERIALS

2.1.1. Description:

2.1.2. Carpet Tile: (CT-1) To be Venture/Anticosti (/Sphagnum, Colour: Gauge

2.1.2.1 Collection Number: 40166

2.1.2.2. Product Colour Number: 15331

2.1.2.3. Yarn Construction: Multilevel Loop

2.1.2.4. Yarn System: Recycled Nylon

2.1.2.5. Yarn Manufacturer: Universal or Equivalent

2.1.2.6. Dye Method: 100% Solution Dyed

2.1.2.7. Soil/Stain Protection: Proteki or Equivalent

2.1.2.8. Preservative Protection: Intersept or Equivalent

2.1.2.9. Tufted Yarn Weight: 746 g/m²

2.1.2.10. Machine Gauge: 47.2 ends/10cm

2.1.2.11. Pile Height: 4 mm

2.1.2.12. Pile Thickness: 3 mm

2.1.2.13. Stitches: 47.2

2.1.2.14. Pile Density: 12.39 ktex

2.1.2.15. Size: 25cm x 100cm

2.1.2.16. Radiant Panel: ASTM E-648 Passes

2.1.2.17. Smoke Density: ASTM E 662 less than 450

2.1.2.18. Flammability: Passes Methenamine Phil Test DOC-FF1-70

2.1.2.19. Lightfastness: AATCC 16-E greater than 4.0 @ 60 AFU's

2.1.2.20. Static: AATCC – 134 less than 3.0 KV

2.1.2.21. Dimensional Stability: AACHEN Din 54318 less than .10%

2.1.2.22. Traffic Classification: Heavy

2.1.2.23. Fire Modification Ratio: 1.7 to 1.9 (AATCC 174 Parts 2&3) 99% Reduction/No Mold 7 Days

2.1.2.24. Preservative Efficacy: (ASTM E 2471) Complete Inhibition

- 2.1.3. Carpet Tile: (CT-2) To be Venture/Mingan/Gneiss, Colour: Fantome
 - 2.1.3.2. Collection Number: 40170
 - 2.1.3.3. Product Colour Number: 15344
 - 2.1.3.4. Yarn Construction: Multilevel Loop
 - 2.1.3.5. Yarn System: Recycled Nylon
 - 2.1.3.5. Yarn Manufacturer: Universal or Equivalent
 - 2.1.3.6. Dye Method: 100% Solution Dyed
 - 2.1.3.7. Soil/Stain Protection: Proteki or Equivalent
 - 2.1.3.8. Preservative Protection: Intersept or Equivalent
 - 2.1.3.9. Tufted Yarn Weight: 746 g/m²
 - 2.1.3.10. Machine Gauge: 47.2 ends/10cm
 - 2.1.3.11. Pile Height: 4 mm
 - 2.1.3.12. Pile Thickness: 3 mm
 - 2.1.3.13. Stitches: 47.2
 - 2.1.3.14. Pile Density: 12.39 ktex
 - 2.1.3.15. Size: 25cm x 100cm
 - 2.1.3.16. Radiant Panel: ASTM E-648 Passes
 - 2.1.3.17. Smoke Density: ASTM E 662 less than 450
 - 2.1.3.18. Flammability: Passes Methenamine Phil Test DOC-FF1-70
 - 2.1.3.19. Lightfastness: AATCC 16-E greater than 4.0 @ 60 AFU's
 - 2.1.3.20. Static: AATCC – 134 less than 3.0 KV
 - 2.1.3.21. Dimensional Stability: AACHEN Din 54318 less than .10%
 - 2.1.3.22. Traffic Classification: Heavy
 - 2.1.3.23. Fire Modification Ratio: 1.7 to 1.9 (AATCC 174 Parts 2&3) 99% Reduction/No Mold 7 Days
 - 2.1.3.24. Preservative Efficacy: (ASTM E 2471) Complete Inhibition
 - 2.1.3.25. Installation: Follow manufacturer's directions.
 - 2.1.3.26. Adhesive: Non-toxic, providing total VOC emission not exceeding 0.5 mg/m² per hour. Vinyl-compatible, quick release adhesive recommended by carpet manufacturer.
 - 2.1.3.27. Reclamation: Recycle through ReEntry. Call 1.866.398.3191.
 - 2.1.3.28. Standard Backing: GlasBac or Equivalent

- 2.1.4. Tools: Paint roller and tray, seam roller, steel measuring tape, chalk line (use white chalk) and carpet knife.
- 2.1.5. Thresholds: Aluminum, screw-down type as recommended by carpet manufacturer, colours selected by the Consultant from manufacturers' standard range.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify the actual Site dimensions and location of adjacent materials prior to commencing work. Notify the Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. PREPARATION

- 3.2.1. Surface Preparation:
 - 3.2.1.1. Ensure floor is clean and free of cracks and protrusions. Remove dirt, paint, debris, grease, oil and loose toppings or finishes. Allow for patching of floor with grout over 30 percent of the floor area to ensure smooth surface.
 - 3.2.1.2. Fill gaps or cracks more than 2mm (1/16") wide and minor depressions with Latex compound. Grind protrusions smooth.
 - 3.2.1.3. Vacuum clean floors prior to installation.

3.3. INSTALLATION

- 3.3.1. Commencement of Work: Refer to the Drawings and Room Finish Schedule for areas where carpet is to be installed. Install the work of this Section after all Subcontractors have completed their work and just prior to completion of the Work, unless otherwise instructed by the Consultant.
- 3.3.2. Measuring: Determine centre of room using standard tile-laying methods. Resulting quadrants should meet at right angles. Offsetting centre chalk line may become necessary to ensure that perimeter tiles will be at least half-size or larger.
- 3.3.3. Pile Direction: Install carpet tiles to achieve monolithic appearance with arrows on back pointing in same direction.
- 3.3.4. Laying Out: To prevent movement of tiles during initial stages and to ensure straight lines and square corners, create an anchor line by laying strips of adhesive alongside each centre chalk line. Lay tiles accurately and firmly along centre lines in selected quadrant. Additional tiles within quadrant should be installed by "stair-step" technique. In some cases, due to partitions, "starting" point is centre of the room. Carpet tiles shall be installed up to partitions, not under partition.
- 3.3.5. Checking Tightness: Measure areas to ensure tight installation. Measure over 11 tiles to attain cumulative space "gained" over 10 joints. The gain must not be greater than 6 mm (1/4"). Utilize this method in continual check of installation.
- 3.3.6. Alignment: As tiles are butted against each other, frequently check at joints with your fingers to see that they are properly aligned. Do not install tiles that seem out of true more than 1.5 mm (1/32").
- 3.3.7. Control Grid: To prevent tiles from shifting in larger areas, about every 6 m (20') to 9 m (30') both in length and width directions, anchor row of tiles. Use texturing paint roller to apply narrow strip of adhesive under "control" tiles.
- 3.3.8. Joints: Take care when butting 1 tile against another. Avoid too much pressure on joining tiles, as it will

cause tiles to "peak" or "buckle". Face pile should be brushed back and tile "tipped" into place, to avoid any pile being caught in joint.

- 3.3.9. Perimeter Tiles: Adhere to floor unless noted otherwise on the Drawings. Lay last whole tile closest to wall and perimeter cuts on adhesive. Perimeter cuts must then be accurately cut and tightly fitted against vertical fixed surface such as wall. In event of an open perimeter design, a fixed reducer strip anchored to floor is necessary to lock tile area in place.
- 3.3.10. Cutting: Cuts are best made from back, whether using template for fitting around columns or at room perimeter. Activation of electrical floor outlets shall follow carpet installation. Affected tiles must be surface-marked with tape.
- 3.3.11. Trimming and Gluing: Whenever tile is cut or trimmed, it shall be adhered to floor.

3.4. SITE QUALITY CONTROL

- 3.4.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of the Consultant at no cost to the Owner.

3.5. CLEANING

- 3.5.1. Immediately following installation, inspection and approval of work by the Consultant, vacuum clean carpet using pile lifter and remove debris.

3.6. PROTECTION

- 3.6.1. Restriction of Traffic: Restrict traffic during installation. Upon completion of installation, do not allow traffic or movement of furniture onto carpet surface until installed area has been anchored at perimeter.
- 3.6.2. Cover entire carpeted area with plastic covering held in place by masking tape at seams and stay- tacking around perimeter, if required by the Consultant.
- 3.6.3. Do not remove carpet protection until directed by the Consultant.
- 3.6.4. Hand over work to the Owner free of blemishes and in perfect condition.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide painting including but not limited to following:
- 1.2.1.1. surface preparation of substrate: abrasive blasting, cleaning and preparation of surfaces for application of paint systems.
 - 1.2.1.2. interior priming and painting of walls, doors frames and some ceilings.
 - 1.2.1.3. exterior or interior sealing, staining and coating of:
 - 1.2.1.3.1. gypsum board ceiling.
 - 1.2.1.3.2. doors and frames
 - 1.2.1.4. provision of materials, labour and equipment required to complete painting work and ancillary work described and implied herein to full intent of the Drawings and Schedules.
 - 1.2.1.5. waste management and disposal of paint, stain and wood preservatives and other related hazardous materials.
- 1.2.2. Section Excludes:
- 1.2.2.1. Painting of:
 - 1.2.2.1.1. pre-finished metal siding, fascia and soffit, coping cap flashing and similar components. Refer to dedicated Specification Sections for special finishes and their effects on the work of this Section.
 - 1.2.2.1.2. chrome, stainless steel, vinyl, plastic laminate and aluminum surfaces throughout unless specified otherwise on the Drawings.
 - 1.2.2.1.3. internal surfaces of steel tanks and stacks.
 - 1.2.2.1.4. sprayed fire-resistive materials.
 - 1.2.2.1.5. wallcoverings unless otherwise noted.
 - 1.2.2.1.6. primed and finish painted equipment furnished by manufacturer unless required to be field painted in 1 common corporate colour as identified in finish schedule.
- 1.2.3. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
- 1.2.3.1. Wood preservative or fire retardant treatment for rough carpentry: Section 06 10 00 - Rough Carpentry.
 - 1.2.3.2. Priming and/or back painting of wood: Section 06 10 00 - Rough Carpentry.
 - 1.2.3.3. Coordination of paint for application on suspended acoustic ceilings: Section 09 51 00 - Acoustic Tile Ceilings.

- 1.2.3.4. Instructions on painting, stenciling and banding of mechanical and electrical work: Division 22, Plumbing, Division 23, Heating, Ventilating and Air Conditioning and Division 26, Electrical.
- 1.2.3.5. Factory assembled pre-finished roof mounted air handling and air conditioning equipment: Division 23, Heating, Ventilating and Air Conditioning.
- 1.2.3.6. Prime and finish coats applied under other Sections. Read carefully other Sections of Specifications to determine extent thereof.

1.3. REFERENCES

1.3.1. Abbreviations and Acronyms:

- 1.3.1.1. DFT: Dry Film Thickness.
- 1.3.1.2. MPI: The Master Painters Institute; www.mpi.net.
- 1.3.1.3. MSDS: Material Safety Data Sheets.
- 1.3.1.4. OPCA: Ontario Painting Contractors Association; www.ontpca.org.
- 1.3.1.5. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
- 1.3.1.6. SRA: Slip Resistant Additive
- 1.3.1.7. SSPC: The Society for Protective Coatings (formerly known as Steel Structures Painting Council); www.sspc.org.
- 1.3.1.8. TSP: Tri-sodium Phosphate.
- 1.3.1.9. ULC: Underwriters' Laboratories of Canada; www.ulc.ca.
- 1.3.1.10. VOC: Volatile Organic Compound.

1.3.2. Definitions:

- 1.3.2.1. Exposed: Visible in completed work. In case of closets, cabinets and drawers, it includes their interiors. Exposed surfaces in underground parking areas are considered "Exterior" for purpose of this Contract. Exposed surfaces in aboveground parking areas are considered "Interior" for the purpose of this Contract.
- 1.3.2.2. Hazardous Waste: Construction and demolition materials that are regulated for disposal by local, city, county, province or federal Authorities Having Jurisdiction.
- 1.3.2.3. Gloss or Sheen: Capacity of a finish on a surface to reflect light at specific angles as tested in accordance with ASTM D523. Following are gloss or sheen types as defined by MPI. Paint colours are PT-1-7 as indicated on the drawings:
 - 1.3.2.3.1. Flat (G1): Lusterless or matt finish. (PT-7)
 - 1.3.2.3.2. Velvet (G2): High side flat sheen finish.
 - 1.3.2.3.3. Eggshell (G3): Low sheen finish.(PT 1-5)
 - 1.3.2.3.4. Satin (G4): Low-medium sheen finish.
 - 1.3.2.3.5. Semi-Gloss (G5): Medium sheen finish.(PT-6)
 - 1.3.2.3.6. Full Gloss (G6): High sheen finish.

1.3.2.3.7. High Gloss (G7): Ultra high sheen finish.

1.3.2.4. Painting: In this Section refers to application of various types of paint, stain, varnishes and lacquers, etc.

1.3.2.5. Surface Preparation: Cleaning or treating of surface to be painted to ensure best possible bond between surface and painting to be applied to surface; remove surface contaminants that will affect performance of painting, without limitations such as oil, grease, salts, dust, dirt, rust, rust scale, mill scale and old coatings where applicable; remove surface imperfections without limitation including, but not limited to, weld spatter, sharp edges, burrs, slivers, laminations, pits, porosities and crevices; prepare surfaces to provide anchor profile or surface profile which improve mechanical bonding of coating to prepared surface by increasing surface area.

1.3.3. Reference Standards:

1.3.3.1. ASTM D523-89(08) - Standard Test Method for Specular Gloss

1.3.3.2. CAN/CGSB-1.500-75 - Methods of Test of Toxic Trace Elements in Protective Coatings

1.3.3.3. CAN/CGSB-85.100-93 - Painting

1.3.3.4. MPI Painting Manual-07 - The Master Painters Institute – Architectural Painting Specification Manual by PDCA

1.3.3.5. MPI Approved Products List-09 – The Master Painters Institute – Approved Products List (Includes United States, Canada and International Editions), 2009

1.3.3.6. SSPC-05 - Systems and Specifications - Steel Structures Painting Manual, Volume 1 & 2

1.4. ADMINISTRATIVE REQUIREMENTS

1.4.1. Pre-installation Meetings:

1.4.1.1. Review the Drawings, details and schedules, determine intent, extent, materials, types of surfaces, locations and be fully cognizant of intent of Work. Review Product literature, MSDS, related safety data, proper disposal requirements and inform those involved in work of this Section.

1.4.1.2. Review Specifications and Drawings for the work of other Sections regarding provisions for prime and finish coats and ensure compatibility with each other and substrate prior to application.

1.4.1.3. Prior to start of work, arrange for a Site meeting of parties associated with the work of this Section. Presided over by the Contractor, include the Consultant, Subcontractor, manufacturer's representative, any Subcontractors whose work will be painted (including mechanical and electrical Subcontractors) or whose work is adjacent to, or whose work or schedule may be affected by the work of this Section.

1.4.1.4. Review Specification for the work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, the Contract staffing, restrictions on areas requiring painting and other matters affecting construction, to permit compliance with intent of this Section.

1.4.2. Scheduling:

- 1.4.2.1. Painting Schedule: Provide within 30 Days of the Region's Notice to Commence Work, together with proposed manufacturer of materials to be used, a Schedule comprised of locations, types of surfaces, types of painting materials (and manufacturer's names) and number of coats to be used.
- 1.4.2.2. Schedule painting operations to prevent disruption of and by other trades. Ensure painting is completed for locations requiring application of finishes by other trades in a timely fashion to prevent delays.
- 1.4.2.3. Schedule painting operation in occupied facilities to prevent disruption of occupants in and about the Site. Carry out painting in accordance with the Owner's operation requirements. Schedule work such that painted surfaces will have dried before occupants are affected. Obtain written authorization from the Consultant or the Owner for changes in work schedule.

1.5. SUBMITTALS

1.5.1. Product Data:

- 1.5.1.1. Submit Product data conforming to Section 01 70 00 – Execution and Closeout Requirements and submit a Schedule of Finishes listing manufacturer's Product name, colour, textures, MSDS and test reports requested for each paint system. Submit test reports for odourless, low or zero VOC products when specified.
- 1.5.1.2. Painting Subcontractor shall receive written confirmation of specific surface preparation procedures and primers used for fabricated steel items from fabricator/supplier to ensure appropriate and manufacturer compatible finish coat materials prior to commencement of painting.
- 1.5.1.3. Painting Subcontractor shall receive written Product data regarding chemical composition of coatings or treatments applied by others (pressure preservatives, admixtures and sealers etc.) and their paintability.
- 1.5.1.4. Submit Product data for concrete and concrete block primers.

1.5.2. Samples: Submit samples 30 Days before materials are required in accordance with Section 01 30 00 - Administrative Requirements. Submit following samples in sizes indicated:

- 1.5.2.1. 2 copies of brushouts minimum 200 mm x 250 mm (8" x 10") of each finish including colour, sheen and texture required at least 30 Days prior to commencement of application. Identify each sample with job, finish, colour name, number, sheen and gloss values, substrate to be applied to, date and name of Subcontractor.

Substrate

Sample, Base Material

1.5.2.1.1. Gypsum board

Face of typical unit

1.5.2.1.2. Doors and frames

Face of typical unit

- 1.5.2.2. Sample panels of stain, varnish, lacquer and other wood finishes on each species of wood specified, minimum 300 mm (12") square and of specified thickness.

1.5.3. Certificates:

- 1.5.3.1. Surface Preparation: Submit manufacturer's representative's written approval of surface preparation methods and any specific recommendations for alternative methods.
- 1.5.3.2. Materials: Submit list of proposed materials prepared by paint manufacturer, for approval at least 60 Days before materials are required. Ensure list bears manufacturer's official certification that materials listed meet or exceed requirements specified herein, are compatible with respective substrates and primer coats, including those applied by the work of other Sections.
- 1.5.4. Site Quality Control Submittals:
 - 1.5.4.1. Submit Site instruction reports in accordance with Section 01 30 00 – Administrative Requirements containing information required by this Section.
 - 1.5.4.2. Progress Reports:
 - 1.5.4.2.1. Submit in accordance with Section 01 30 00 – Administrative Requirements.
 - 1.5.4.2.2. Arrange to have paint manufacturer's representative inspect work of this Section on a regular basis and prepare weekly job progress reports. Submit copy of reports to the Consultant.
- 1.5.5. Operation and Maintenance Data: Submit 4 copies of list of materials used, together with MSDS for each Product for incorporation into Maintenance Manuals. Include maintenance information such as cleaning and full pigment information for future touch up.
- 1.6. MAINTENANCE MATERIAL SUBMITTALS**
- 1.6.1. Extra Stock Materials: Submit to the Owner 4 extra litres of the field colour and 1 extra litre of the trim colour can of each different type and colour and degree of gloss of paint used (batch mix) on this Contract for touch-ups. Ensure paint is boxed and in sealed, unopened cans in undamaged condition, with name of manufacturer, contents, type and colour clearly indicated on a label securely adhered to can. Give to the Consultant at time of final inspection.
- 1.7. QUALITY ASSURANCE**
- 1.7.1. Qualifications:
 - 1.7.1.1. Applicators:
 - 1.7.1.1.1. Execute the work of this Section by a firm which has adequate plant, equipment and skilled workers to perform work expeditiously and which is known to have been responsible, during immediate past 5 years, for installations similar to work contained herein. Firm to be fully conversant with applicable laws, bylaws, codes, fire, health and safety regulations and other regulations which govern.
 - 1.7.1.1.2. Provide the work of this Section executed by competent applicators who have a minimum of 5 years' experience in application of the Products, systems, coatings and assemblies specified and with approval and training of Product manufacturers.
 - 1.7.1.1.3. Ensure materials, preparation and workmanship conforms to requirements of MPI Painting Manual.
- 1.7.2. Certifications: Ensure paint manufacturers and Products used are listed under Approved Product List section of MPI Painting Manual.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Delivery and Acceptance Requirements:

- 1.8.1.1. Deliver to the Site, materials manufacturer's original, sealed and labeled containers bearing manufacturer's name, brand name, type of paint or coating and colour designation, degree of gloss, batch number, standard compliance, materials content as well as mixing, reducing and application requirements.
- 1.8.1.2. Manufacturer to certify that materials delivered to Site conform to approved list and are of top quality Product range.

1.8.2. Storage and Handling Requirements:

- 1.8.2.1. Store on the Site, materials in manufacturer's sealed and labeled containers.
- 1.8.2.2. Comply with applicable local fire and building code requirements during storage and application.
- 1.8.2.3. Store containers of paint, thinner and other volatile materials in secure, well ventilated location, heated to minimum 10 deg C (14 deg F), where they will not be exposed to excessive heat or direct solar radiation. Keep tightly closed when not in actual use.
- 1.8.2.4. Presence of any unauthorized materials or containers on Site is sufficient cause for rejection of paint materials on the Site at that time.
- 1.8.2.5. Protect floor and wall surfaces in storage areas from paint drips and splatters.
- 1.8.2.6. Be totally responsible for prevention of fire or explosion caused by improper storage of paints, solvents, rags and similar items. Store fire hazardous materials in location and in manner approved by local fire authority. Post "No Smoking" signs in areas of storage and mixing and strictly enforce this requirement. Provide and maintain CO2 fire extinguishers of minimum 9 kg (20 lb) capacity. Repair damage to storage area or surrounding area at no cost to the Owner.
- 1.8.2.7. Where toxic, volatile, explosive, flammable materials are used, provide adequate fireproof storage lockers and take necessary precautions and post adequate warnings (eg "No Smoking" signs) as required.

1.8.3. Packaging Waste Management: Leave storage areas clean and free from evidence of occupancy. Dispose of packaging in appropriate method as required by Authorities Having Jurisdiction, and in an environmentally responsible manner in accordance with LEED® guidelines and local requirements.

1.9. SITE CONDITIONS

1.9.1. Ambient Conditions:

- 1.9.1.1. Paint and finish in clean, dust-free, properly ventilated and adequately lit areas minimum 323 Lx (30 ft candles) on surfaces to be painted or decorated.

- 1.9.1.2. Provide each paint material in accordance with the manufacturer's recommended tolerances for:

- 1.9.1.2.1. Substrate Moisture Content: Perform tests with a properly calibrated electronic moisture meter to ensure compliance with manufacturer's recommendations. Without limitation, maximum moisture content as follows:
 - 1.9.1.2.1.1. Gypsum Based Board and Plaster: Maximum 12 - 14%.
 - 1.9.1.2.1.2. Wood: Maximum 15%.
- 1.9.1.3. Temperature and Ventilation:
 - 1.9.1.3.1. Do not provide paint under ambient and surface temperatures less than those required below in any instance for 24 hours before, during and 7 Days after installation.
 - 1.9.1.3.2. Provide ventilation to remove odours, evaporating solvents and moisture. Maintain adequate ventilation at all times to control excessive humidity.
 - 1.9.1.3.3. Ensure adequate temporary ventilation is provided under Section 01 50 00 - Temporary Facilities and Controls for protection of workers from toxic fumes.
 - 1.9.1.3.4. Interior Paint:
 - 1.9.1.3.4.1. Water Based Paints: Maintain minimum interior surface and ambient air temperature of between 18 deg C (65 deg F) and 32 deg C (90 deg F) during application and drying of paint and maintain until building occupancy occurs.
 - 1.9.1.3.4.2. Solvent Based Paints: Maintain minimum interior surface and ambient air temperature of between 7 deg C (45 deg F) and 35 deg C (95 deg F) during application and drying of paint and maintain until building occupancy occurs.
 - 1.9.1.3.4.3. Do not undertake interior painting on surfaces where condensation has or will form due to presence of high humidity and lack of proper ventilation.
 - 1.9.1.3.5. Exterior Paint:
 - 1.9.1.3.5.1. Do not undertake exterior painting if air and surface temperature are expected to fall below 10 deg C (50 deg F) before coating has dried. Avoid painting during winds, weather conditions which may affect paint application or following rain. Wait until frost, dew or condensation has evaporated. Avoid painting surfaces exposed directly to hot summer sun.
 - 1.9.1.3.5.2. Do not apply paint in snow, rain, fog or mist or when relative humidity exceeds 85% or dew point is less than 3 deg C (5 deg F) difference between air and surface temperature, or damp or wet surfaces unless surface to be painted is enclosed and conditioned to required temperatures and ambient conditions required for application.
 - 1.9.1.3.5.3. Where required, suitable weatherproof covering and sufficient heating facilities are to be provided which will enable required ambient and surface temperatures.

1.10. WARRANTY

- 1.10.1. Manufacturer Warranty: Warrant the work of this Section for a period of 2 years against defects and/or deficiencies. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of the Consultant and at no expense to the Owner. Defects include but are not limited to material and workmanship defects such as: improper cleaning and preparation of surfaces, entrapped dust and dirt, material shrinkage, cracking, splitting and defective workmanship including but are not limited to failure in bubbling, drips, runs, blistering, uneven coverage, misses, poor cutting in and delamination.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of the Drawings, Schedules and Specifications:

2.1.1.1. Benjamin-Moore & Co., Limited; www.benjaminmoore.com

2.1.1.2. Dulux PPG www.dulux.com

2.1.1.3. Para Paints; www.para.com

2.1.1.4. Pittsburgh Paints; www.pittsburghpaints.com

2.1.1.5. The Sico Inc. Company; www.sico.com

2.1.1.6. The Sherwin-Williams Company; www.sherwin-williams.com

[2.1.1.7. Equivalent](#)

- 2.1.2. Substitution Limitations: Comparable Products from other manufacturers not listed in this Section will be accepted provided they meet requirements of MPI approved paints and this Specification after full review by the Consultant.

- 2.1.3. Source Limitations: Provide primers for each coating system from same manufacturer as finish coats.

2.2. MATERIALS

- 2.2.1. Description:

2.2.1.1. Regulatory Requirements:

2.2.1.1.1. Provide a Pre-Start Health and Safety Review in accordance with *Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 – Quality Requirements for further requirements.

2.2.1.1.2. Conform to latest edition of Industrial Health and Safety Regulations issued by applicable Authorities Having Jurisdiction in regard to Site safety (ladders, scaffolding, ventilation, etc.)

- 2.2.1.1.3. Comply with more stringent of applicable laws, bylaws, codes, fire regulations, health and safety regulations of Authorities Having Jurisdiction or requirements of this Specification. Ensure standards used for work of this Section is considered a minimum.
- 2.2.1.1.4. Where required, ensure paints and coatings meet flame spread and smoke developed ratings designated by the OBC and any other local code requirements and/or Authorities Having Jurisdiction requirements..
- 2.2.1.1.5. Comply with toxic trace limitations stipulated by Authorities Having Jurisdiction as tested in accordance with CAN/CGSB-1.500.
- 2.2.1.1.6. Conform to requirements of local Authorities Having Jurisdiction in regard to storage, mixing, application and disposal of paint and related waste.

2.2.2. Performance/ Design Criteria:

- 2.2.2.1. Provide best practices specified or recommended in CAN/CGSB-85.100 and MPI Painting Manual.
- 2.2.2.2. The Consultant reserves right to refuse any paint or finishing material if in his/her opinion it is not suitable or adequate for proposed use.
- 2.2.2.3. Provide paint and finishing materials of highest grade, top quality line of Products from manufacturer. Paint material containers not displaying manufacturer's Product identification are not acceptable. Ensure paint is not diluted.
- 2.2.2.4. Use brand of paint chosen throughout the work of this Section, except where specified otherwise. As far as practical, factory mix paint for immediate application without thinning or alteration at Site.
- 2.2.2.5. Provide primers in recommended DFT/coat.
- 2.2.2.6. Only materials (primers, paints, coatings, varnishes, stains, lacquers, etc.) listed in MPI Approved Product List are acceptable for use on this Project.
- 2.2.2.7. Provide other materials such as linseed oil, shellac, thinners, solvents, etc. of highest quality Product of an MPI listed manufacturer and which are compatible with paint materials being used as required.
- 2.2.2.8. Ensure materials used are lead and mercury free and have low VOC content where possible.

2.2.3. Finishes:

2.2.3.1. Typical Paint:

2.2.3.1. PT-1 to PT-5 to be Eggshell (G3). Colours to architect's later selection.

2.2.3.2. PT-6 to be Semi-Gloss (G5). Colour to architect's later selection.

2.2.3.3. PT-7 to be Flat (G1). Colour to architect's later selection.

- 2.2.4. Paint and materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, and the like) shall be in accordance with the MPI Manual" Approved Product listing and shall be from a single manufacturer for each system used
- 2.2.5. Other paint materials, such as linseed oil, shellac, and the like, shall be highest quality Products of an approved manufacturer listed in the MPI Manual and shall be compatible with other coating materials as required.
- 2.2.6. Paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes or sags.
- 2.2.7. Where required, paints and coatings shall meet flame spread and smoke developed ratings designated by building code requirements and/or Authorities Having Jurisdiction.
- 2.2.8. Paint finishes shall be as selected by the Consultant. Locations shall be as indicated or scheduled in the Contract Documents.
- 2.2.9. Colours: Prior to beginning painting work, Subcontractor will be furnished with copy of colour schedule. Colours as selected by the Consultant.
- 2.2.10. Gloss /Sheen Ratings
 - 2.2.10.1. Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following values:
 - 2.2.10.1.1. Flat (G1): Lusterless or matt finish.
 - 2.2.10.1.2. Velvet (G2): High side flat sheen finish.
 - 2.2.10.1.3. Eggshell (G3): Low sheen finish.
 - 2.2.10.1.4. Satin (G4): Low-medium sheen finish.
 - 2.2.10.1.5. Semi-Gloss (G5): Medium sheen finish.
 - 2.2.10.1.6. Full Gloss (G6): High sheen finish.
 - 2.2.10.1.7. High Gloss (G7): Ultra high sheen finish.

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions:
 - 3.1.1.1. Do work only when surfaces and conditions are satisfactory for production of quality work. Report to the Consultant in writing any surfaces which are found to be unsatisfactory.
 - 3.1.1.2. Ensure temperature of surfaces to be finished are as required for application of finish. Refer to "Temperature and Ventilation" subsection specified herein. Ensure surfaces are dry and free of dirt, grease and other contaminants that may affect applied finish.
 - 3.1.1.3. Verify moisture content of surfaces with electronic moisture meter. Do not proceed without written directions if moisture reading is higher than as required for application. Refer to "Ambient Conditions" subsection specified herein for substrate moisture content requirements.

- 3.1.1.4. If substrate is steel, do not apply coatings over moisture or when surface temperature is within 3 deg C (5 deg F) of dew point.
- 3.1.1.5. If substrate is wood, do not stain or paint if moisture reading is higher than 15%. Inspect work to assure surfaces are smooth, free from machine marks and nail heads have been countersunk.
- 3.1.1.6. If substrate is cast-in-place concrete, allow to cure for 60 to 90 Days before proceeding with priming.
- 3.1.1.7. If substrate is precast prestressed concrete, inspect and accept or reject filled-in surface blow holes.
- 3.1.1.8. If substrate is new plaster or masonry, allow to cure for 30 to 90 Days. Ensure moisture content is between 12% and 14% and test for alkalinity and neutralize (pH 6.5 - 7.5) before proceeding with priming.
- 3.1.1.9. If substrate is gypsum board, inspect to ensure joints are completely filled and sanded smooth. Inspect surfaces for "nail popping", screw heads not recessed and taped, breaks in surface or other imperfections and have repaired as required.
- 3.1.1.10. Verify each substrate is dry and not frozen and free from tool and sandpaper marks, dust, rust, insects, grease and other foreign matter liable to impair finished work.
- 3.1.2. Evaluation and Assessment:
 - 3.1.2.1. Prior to commencement of work of this Section, thoroughly examine (and test as required) conditions and surfaces scheduled to be painted and report in writing to Consultant any conditions or surfaces that will adversely affect work of this Section.
 - 3.1.2.2. Do not commence painting work until adverse conditions and defects have been corrected and surfaces and conditions are accepted by the Consultant.
 - 3.1.2.3. Commencement of work does not imply acceptance of surfaces except as qualified in this Section. Such surfaces as concrete, masonry, structural steel and miscellaneous metal, wood, gypsum board and plaster, is not responsibility of Subcontractor responsible for the work of this Section. Commencement of work implies acceptance of previously completed work.
- 3.2. PREPARATION**
 - 3.2.1. Protection of In-Place Conditions:
 - 3.2.1.1. Provide scaffolding, staging, platforms and ladders, as required for execution of work. Erect scaffolding to avoid interference with work of other trades. Comply with the Occupational Health and Safety Act.
 - 3.2.1.2. During the work of this Section, provide drop cloths, plastic, plywood or metal sheets to protect floors in areas assigned for storage and mixing of paints. Cover finished floors, walls, ceilings and other work in vicinity and protect from paint and damage.
 - 3.2.1.3. Protect work of other trades against paint splattering and Make Good at own expense any such damage.
 - 3.2.1.4. Protect exterior surfaces and areas, including landscaping, walks, drives, adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any door and frame labels and signage from painting 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.

- 3.2.1.5. Remove and securely store miscellaneous and finish hardware and surface fittings, electrical switch and outlet covers, receptacle plates, louvers, fittings and fastenings, to protect from paint splatter. Mask items not removable. Use sufficient drop cloths and

protective coverings for full protection of floors, furnishings, mechanical, electrical and special equipment, other components of building which do not require painting or to be removed, from paint spotting and other soiling. Carefully clean and re-install items when paint is dry. Clean any components that are paint spotted or soiled. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes).

- 3.2.1.6. Prohibit traffic, where possible, from areas where painting is being carried out and until paint is cured. Post "wet paint" or other warning signage during and on completion of work. Provide also warning signs at points of entry to areas where painting is applied and drying.

3.2.2. Surface Preparation:

- 3.2.2.1. Prepare defective surfaces to obtain a satisfactory substrate and in accordance with paint manufacturer's instructions.

- 3.2.2.2. Ensure exterior work is not performed during or immediately following rain, frost or dew.

- 3.2.2.3. Prior to painting, sweep areas dust-free.

- 3.2.2.4. Clean soiled surfaces to be painted.

- 3.2.2.5. Remove efflorescence, chalk, dust, dirt, oil, grease, rust, form oil, release agents, loose mill scale and other extraneous matter from surfaces. Vacuum clean floors before painting; wipe clean adjacent surfaces and surfaces to be painted before work is commenced to prevent dust and debris damage to wet paint.

- 3.2.2.6. Remove mildew by scrubbing affected area with solution of 150 g (5.3 oz) TSP and 125 g (4.4 oz) bleach in 3.5 l (0.92 gal) water. Rinse well with clean water and allow to dry. If condition is serious, source out finishes with extra mildew resistance.

- 3.2.2.7. Be responsible for surface preparation to suit surface condition and conform to level of cleaning based on SSPC, recommended metal cleaning procedures most commonly used to suit Site conditions.

- 3.2.2.7.1. Woodwork for Clear Finish or Stain: Sand smooth woodwork to be finished using 150 grit paper followed by a second sanding using 220 grit paper and clean surfaces free of dust using brush, compressed air or tack rags before applying first coat. Abrade surfaces with stiff brush to remove loose fibers and splinters. Fill nail holes, splits and scratches with non-shrinking filler tinted to match local grain condition after first coat is dry. Sand lightly between coats with No. 220 sandpaper and remove dust.

- 3.2.2.7.2. Remove salt deposits that may appear on wood surfaces treated with fire retarder.

- 3.2.2.7.3. Obtain inspection of glue laminated beams by assigned painting inspector to ensure shop sealer has been applied. Where non-specified shop sealer has been applied to beams or columns, remove and refinish in accordance with manufacturer's written instructions.

- 3.2.2.7.4. Wood Doors: Remove doors before painting to paint bottom and top edges and re-hang once dry. Paint or finish top and bottom edges of doors to be

painted or stained. Touch-up or refinish tops and edges after fitting.

3.2.2.8. Previously Finished Surfaces: Clean existing interior and exterior surfaces to be repainted or varnished to provide bond. Remove rust, scale, oil, grease, mildew, chemicals and other foreign matter. Remove loose paint and fill flush with suitable patching material. Clean off bubbled, cracked, peeling or otherwise defective paint by stripping with suitable environmental strippers or by burning. Do not burn off paints suspected of having lead content. Treat residue from stripping as hazardous waste. Flatten gloss paint and varnish with sandpaper and wipe off dust. If previous coatings have failed so as to affect proper performance or appearance of coatings to be applied, remove previous coatings completely and prepare substrates properly and refinish as specified for new work. Leave entire surface suitable to receive designated finishes and in accordance with finish manufacturer's instructions.

3.2.2.9. Gypsum Board:

3.2.2.9.1. Examine and ensure gypsum board surfaces are without defects or deficiencies and suitable to receive painting applications. Commencement implies acceptance of gypsum board work. Examine surfaces after for imperfections showing through and fill small nicks or holes with patching compound and sand smooth. Examine surfaces after priming for imperfections showing through.

3.2.2.9.2. Clean surfaces dry, free of dust, dirt, powdery residue, grease, oil, wax and any other contaminants. Sand and dust as necessary prior to painting and between coats to provide an anchor for next coat and to remove defects visible from a distance up to 1 m (39").

3.2.2.10. Fire Resistive Coatings: Coordinate with coating manufacturer for surface preparation requirements to ensure proper adhesion of finish.

3.3. APPLICATION

3.3.1. Safety Precautions: When handling solvent coating materials, wear approved vapour/particulate respirator as protection from vapors. Dust respirators do not provide protection from vapours.

3.3.2. Material Compatibility: Provide primers and finish coat materials compatible with each other and substrate including fillers.

3.3.3. Mixing and Tinting:

3.3.3.1. Unless otherwise specified in this Section or pre-approved, paint shall be ready and factory tinted. Re- mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment and colour and gloss uniformity.

3.3.3.2. Mix and prepare paint materials including paste, powder or catalyzed paint mixes in strict accordance with manufacturer's directions for particular material and coat to be applied to produce a mixture of uniform density. If reducing is required, do so in accordance with recommendations of manufacturer for particular material and coat.

3.3.3.3. Where thinner is used, addition is not to exceed manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.

3.3.3.4. Mix primer-sealer with a certain amount of colour coat in proportions recommended by manufacturer of material actually used. Tint undercoats and each finish coat with correct type colours, for identification of each succeeding coat.

3.3.3.5. Thoroughly mix materials before application. Apply materials evenly, under adequate

illumination, free from sags, runs and other defects. Do cutting-in neatly.

- 3.3.4. Obtain colour chart giving colour schemes and gloss value for various areas from the Consultant. Ensure colour chart gives final selection of colours and surface textures of finishes and whether finishes are transparent (natural) or opaque (paint).
- 3.3.5. Provide finish uniform in sheen, colour and texture, free from streaks, shiners and brush or roller marks or other defects.
- 3.3.6. Apply materials in accordance with manufacturer's directions and specifications paying particular attention to appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or manufacturer's paint specifications require earlier applications. Do not use adulterants. Do any reduction of coating's viscosity in accordance with manufacturer's directions.
- 3.3.7. Use up paints within period of shelf life recommended by paint manufacturer.
- 3.3.8. Ensure successive coatings are harmonious chemical compositions and materials of same manufacturer.
- 3.3.9. Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1 m (39").
- 3.3.10. Ensure each coat is dry and hard before a following coat is applied.
- 3.3.11. Continue through paint finish behind wall-mounted items (e.g. chalk and tack boards).
- 3.3.12. Finish listed surfaces indicated on Room Finish Schedule(s) and/or noted on the Drawing(s) and as specified in the Contract Documents. Refer to the Finish Schedule for type, location and extent of finishes required and include all touch-ups and field painting necessary to complete work shown, scheduled or specified.
- 3.3.13. Finishes and number of coats specified in Room Finish Schedule are intended as minimum requirements guide only. Refer to manufacturer's recommendations for exact instructions for thickness of coating to obtain optimum coverage and appearance. Some materials and colours may require additional coats and deeper colours may require use of manufacturers' special tinted primers. Unless otherwise specified, provide Premium Grade finish as defined by MPI as minimum finish.
- 3.3.14. Paint entire plane of areas exhibiting incomplete or unsatisfactory coverage and of areas which have been cut and patched. Patching is not acceptable. Vary each coat slightly in successively darker tones to permit supervision identity.
- 3.3.15. Do not paint baked paint surface, chrome plated, stainless steel, aluminum or other surfaces finished with final finish in factory. Finish paint primed surfaces.
- 3.3.16. Advise the Consultant when each applied paint coat can be inspected. Do not recoat without inspection. Tint each coat slightly to differentiate between applied coats.
- 3.3.17. Apply additional paint coats, beyond number of coats specified for any surface, to completely cover and hide substrate and to produce a solid, uniform appearance.
- 3.3.18. Apply primer coat soon after surface preparation is completed to prevent contamination of substrate.
- 3.3.19. Primer/Sealers: Apply primer-sealer coats by brush or roller. Permit to dry in accordance with manufacturer's recommendations before applying succeeding coats. Touch up suction spots and sand between coats with No. 120 sandpaper.
- 3.3.20. Metals: Apply primer coat to unprimed ferrous metal surfaces. Where sandblast preparation is specified, apply specified primer immediately after blast cleaning.

3.3.21. Woodwork:

- 3.3.21.1. Fill open grain woods with filler tinted to match wood and work well into grain. Wipe excess from surface before filler sets.
- 3.3.21.2. Sand smooth paint and varnish undercoats prior to recoating.
- 3.3.21.3. Prime woodwork designated for painting as soon as possible after delivery to Site and before installation. Prime cut surfaces, whether exposed or not, i.e. 6 edges of wood doors, before installation. Prime cut surfaces of woodwork to receive transparent finish with 1 coat of transparent finish reduced 25% or as directed by manufacturer.
- 3.3.21.4. Apply final coats on smooth surfaces by roller or brush. Hand brush wood trim surfaces.

3.3.22. Allow each coat of paint to cure and become dry and hard before application of succeeding coats (unless manufacturer's directions require otherwise).

3.3.23. Before finishing paint coats are applied, inspect and touch-up shop coats of primers previously applied by other Subcontractors or fabricators.

3.3.24. Provide paint coating thicknesses indicated, measured as minimum DFT.

3.3.25. Apply a minimum of 4 coats of paint where deep or bright colours are used to achieve satisfactory results.

3.3.26. Ledges: Finish projecting ledges, both above and below sight lines, as specified for adjacent surfaces.

3.3.27. Light Coves: Paint light coves white whether a light lens is installed or not, unless otherwise indicated.

3.3.28. Interior Columns: Finish interior columns same as walls of room unless otherwise indicated.

3.3.29. Existing Spaces:

- 3.3.29.1. Refinish existing surfaces of rooms or areas which have been damaged, altered or otherwise affected by work. Also finish "new" work occurring thereon unless otherwise specified. Use same procedure as for new work but primer (or filler, stain and sealer in case of varnish finish) may be omitted. Prepare existing surfaces as specified in this Section. Ensure finish matches previous finish.
- 3.3.29.2. Paint or repaint rooms or areas where noted on the Room Finish Schedule and/or as indicated on the Drawings.
- 3.3.29.3. Repaint surfaces entirely between changes of plane.
- 3.3.29.4. Use finish coat of respective new surface paint system for minor repair of existing finishes. Use system primer where existing finishes are damaged down to bare surface.
- 3.3.29.5. Extend painting to a suitable boundary to avoid a "patched" effect. Sand, wire-brush, or scrape such existing finished surfaces to remove loose paint and to reduce gloss. Also clean existing films of dirt, grease or wax. If metallic surfaces are rusted, remove loose scale to provide a firm surface. Patch and sand cracks and other imperfections.
- 3.3.29.6. Provide paint to interior existing spaces effected by alterations and shelled-in spaces in accordance with following:
 - 3.3.29.6.1. Paint walls to nearest inside and outside corners for full wall height.
 - 3.3.29.6.2. Paint columns floor to ceiling.

- 3.3.29.6.3. Paint full ceilings to nearest wall or bulkhead.
- 3.3.29.6.4. Unless indicated otherwise match existing colour.
- 3.3.29.6.5. Where the Room Finish Schedule indicates existing and/or new wall finishes to be painted, existing surfaces such as existing door and frames, mechanical supply and return air grilles (both on walls and ceilings), access doors and electrical panels which have been previously painted shall be painted for a complete finish room. If the Room Finish Schedule indicates “-” it denotes entire room need not be painted, paint only patched area.

3.3.30. Mechanical and Electrical Services:

- 3.3.30.1. Unless otherwise specified or noted in the Contract Documents, paint “unfinished” conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and texture to match adjacent surfaces, in following areas:
 - 3.3.30.1.1. where exposed-to-view in exterior and interior areas.
 - 3.3.30.1.2. in interior high humidity interior areas.
 - 3.3.30.1.3. in boiler room, mechanical and electrical rooms.
- 3.3.30.2. Read Divisions 21, 22, 23, 26, 27 and 28 for their requirements and further instruction on painting mechanical and electrical work and perform such work under supervision of respective Subcontractors for the mechanical and electrical work.
- 3.3.30.3. Finish paint primed mechanical equipment: heaters, convectors, radiators, wall fin perimeter induction units, fan coil units and similar items. Ensure use of heat resistant paint on surfaces where operating surface temperature will exceed 65 deg C (150 deg F).
- 3.3.30.4. Prime and paint exposed, unfinished electrical raceways, fittings, outlet boxes, junction boxes, pull boxes and similar items.
- 3.3.30.5. Take steps to protect gauges, identification plates and similar items from being painted over or paint splattered.
- 3.3.30.6. Remove grilles, covers, access panels for mechanical and electrical systems from installed location and paint separately, if these items are not factory finished. Paint adjacent surfaces after removal and reinstall when surfaces are dry.
- 3.3.30.7. Paint work shall match surfaces they are seen against unless directed otherwise by the Consultant.
- 3.3.30.8. Paint interior surfaces of air ducts visible through grilles and louvres with 1 coat of flat black metal paint to limit of sight line.
- 3.3.30.9. In unfinished areas leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- 3.3.30.10. Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- 3.3.30.11. Do not paint over nameplates.
- 3.3.30.12. Paint behind louvres grilles and diffusers for minimum of 1220 mm (4' – 0") beyond sight lines with primer and 1 coat of matt black (non-reflecting) paint.
- 3.3.30.13. Paint each surface inside of light valances.

- 3.3.30.14. Paint disconnect switches for fire alarm system and exit light systems in red enamel as required by Authorities Having Jurisdiction.
- 3.3.30.15. Paint fire protection piping and sprinkler lines in accordance with mechanical requirements. Keep sprinkler heads free of paint.
- 3.3.30.16. Paint [yellow] or band all natural gas piping in accordance with mechanical requirements
- 3.3.30.17. Back prime and paint face and edges of plywood service panels for telephone and electrical equipment before installation gray, semi-gloss. Leave equipment in original finish except for touch-up as required and paint conduits, mounting accessories and other unfinished items.
- 3.3.30.18. Paint exterior steel electrical light standards. Do not paint outdoor transformers and substation equipment.
- 3.3.30.19. Seal exposed unfinished concrete slabs on grade unless otherwise noted otherwise on the Drawings or the Room Finish Schedule.

3.4. SITE QUALITY CONTROL

3.4.1. Site Tests and Inspections:

- 3.4.1.1. Provide and coordinate Site inspection service by manufacturer's representative in advance of work commencing and during progress of work to ensure correct use and application of each specified material. Manufacturer's representative shall review and submit approval of surface preparation methods in specifications or obtain specific recommendations for alternative methods. Report such conditions to the Consultant.
- 3.4.1.2. As work progresses and upon completion of Work, submit written reports and manufacturers' confirmation that materials and application methods conform to manufacturers' requirements.
- 3.4.1.3. Inspect surfaces, preparation and paint applications.

3.4.2. Non-Conforming Work:

- 3.4.2.1. Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction to the Consultant at no cost to the Owner. Touch up small affected areas, repaint large affected areas or areas without sufficient DFT of paint. Remove runs, sags of damaged paint by scraper or by sanding prior to application of paint. Following are considered nonconforming qualities:
 - 3.4.2.1.1. Lack of Uniformity:
 - 3.4.2.1.1.1. 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.
 - 3.4.2.1.1.2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 - 3.4.2.1.1.3. damage due to touching before paint is sufficiently dry or any other contributory cause.
 - 3.4.2.1.1.4. damage due to application on moist surfaces or caused by inadequate protection from weather.

- 3.4.2.1.1.5. damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).
 - 3.4.2.1.2. Aesthetic Problems: If following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
 - 3.4.2.1.2.1. visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1 m (39").
 - 3.4.2.1.2.2. visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1 m (39").
 - 3.4.2.1.2.3. visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 - 3.4.2.1.2.4. when final coat on any surface exhibits a lack of uniformity of colour, sheen, texture and hiding across full surface area.
 - 3.4.3. Manufacturer Services: Arrange for manufacturer's representative to visit Site at intervals during surface preparation and paint coating application to ensure proper specified surface preparation is being performed, specified Products are being used, appropriate number of coats are being applied and specified finishing procedures are being carried out.
 - 3.5. CLEANING**
 - 3.5.1. Keep waste rags in covered metal drums containing water and remove from building at end of each Day. Remove other combustible rubbish materials and empty paint cans each Day from Site and safely dispose of same in accordance with requirements of Authorities Having Jurisdiction.
 - 3.5.2. Clean equipment and dispose of wash water/solvents as well as other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers/strippers in accordance with safety requirements of Authorities Having Jurisdiction.
 - 3.5.3. Clean containers used for storage, mixing and application of materials free of foreign materials and residue.
 - 3.5.4. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.
 - 3.5.5. Clean adjacent surfaces which have been painted, soiled or otherwise marred. Remove spilled, splashed, splattered or sprayed paint as work progresses using means and materials that are not detrimental to affected surfaces.
 - 3.5.6. Remove masking and other protection provided under this Section.
 - 3.5.7. Remove temporary protective wrappings provided by others for protection of work after completion of painting operations unless instructed otherwise.
 - 3.5.8. Painting work will not be considered complete until spatters, drippings, smears and overspray have been cleaned and removed to satisfaction of the Consultant.
 - 3.5.9. Make Good any damage to structure building surfaces or furnishings resulting from painting operations at no cost to the Owner.
 - 3.5.10. Waste Management:
 - 3.5.10.1. Disposal of Paint Waste:
-

- 3.5.10.1.1. Be responsible for removal and disposal of material and waste generated by the work of this Section.
- 3.5.10.1.2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are hazardous products and are subject to regulations for disposal. Obtain information on these controls from applicable Authorities Having Jurisdiction.
- 3.5.10.1.3. Separate and recycle waste materials. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility. Treat materials that cannot be reused as hazardous waste and dispose of in an appropriate manner.
- 3.5.10.1.4. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- 3.5.10.1.5. To reduce amount of contaminants entering waterways, sanitary/storm drain systems or into ground adhere to following procedures:
 - 3.5.10.1.5.1. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case clean equipment using free draining water.
 - 3.5.10.1.5.2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - 3.5.10.1.5.3. Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - 3.5.10.1.5.4. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - 3.5.10.1.5.5. Dry empty paint cans prior to disposal or recycling (where available).
 - 3.5.10.1.5.6. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
- 3.5.10.2. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL INSTRUCTIONS

- 1.1.1. Comply with Division 1 requirements and documents referred to in this Section.

1.2. SUMMARY

- 1.2.1. Section Includes: Provide miscellaneous specialties including but not limited to following:
 - 1.2.1.1. Washroom, kitchen and miscellaneous accessories and appliances.

1.3. SUBMITTALS

- 1.3.1. Samples: Submit samples If requested by Consultant
- 1.3.2. Submit cutsheets for Architect and Owner review of all products listed in section 2.2. Manufactured Units.

1.4. CLOSEOUT SUBMITTALS

- 1.4.1. Operational and Maintenance Data: Submit maintenance instructions.

1.5. WARRANTY

- 1.5.1. Manufacturer Warranty: Warrant work of this Section for period of 3 years from date of Substantial Performance against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.

PART 2 - PRODUCTS

2.1. ASSEMBLY

- 2.1.1. Description:
 - 2.1.1.1. Regulatory Requirements: Provide a Pre-Start Health and Safety Review in accordance with *the Occupational Health and Safety Act (Ontario)*, Regulation 851, as amended. Refer to Section 01 40 00 for further requirements.

2.2. MANUFACTURED UNITS

- 2.2.1. Recessed sanitary napkin dispenser, Bobrick #B-3513 - Stainless steel finish
- 2.2.2. Toilet paper dispenser, Bobrick #B-2892, Satin finish
- 2.2.3. Swing-Up grab bar, Bobrick #B-4998 – Satin finish
- 2.2.4. Straight grab bar, Bobrick #B-5806 x 24: 24" (610mm) – Satin finish
- 2.2.5. 90 Degree grab bar 30"x30", Bobrick #B-5898 - Satin finish
- 2.2.6. Horizontal recessed baby change table, Koala Kare #KB110-SSRE – Stainless steel finish
- 2.2.7. Recessed paper towel dispenser/disposal unit, Bobrick #B-3803 – Satin finish

- 2.2.8. Recessed paper towel dispenser/disposal unit, Bobrick #B-36903 – Satin finish
- 2.2.9. Wall hooks, cb2 Nicolo Knurled polished nickel (three units)
- 2.2.10. Mirror 24"x42" Vertical mount, CR Laurence www.crlaurence.ca #MLED2442BL
- 2.2.11. Full extension cargo Recycling centre, Richelieu #491318100 complete with 15L and 37L bins and Lids for cargo bins, (1) Richelieu#B481315100 and (1) Richelieu#B481337100 and richelieu#L481315100
- 2.2.12. Euro-Cargo II Recycling Centre, Richelieu #8461464910 (Bin quantity = Three – 2x38L and 1x19L), Dark Grey finish, slow close. Complete with bins (2) Richelieu#361435910 and (1) Richelieu#B461419910.
- 2.2.13. LG Fridge Model# LBNC 12231W, bottom freezer white
- 2.2.14. GE Fridge Model# GBE21AGKWW, bottom freezer white
- 2.2.15. LG Microwave 1.5 CU. FT. Model#MSER159OS, Stainless Steel finish
- 2.2.16. Sliding pass-through lockable window, CR Laurence www.crlaurence.ca #DW4836OXGDU

PART 3 - EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Conform to manufacturer's printed instructions for accurate, secure installation. Ensure proper operation.
- 3.2.2. Provide work of this Section true to dimensions, square, plumb, level and free from distortion or defects detrimental to appearance and performance.
- 3.2.3. Provide necessary reinforcing including but not limited to steel stud backup and securely fasten components to suit design requirements. Ensure proper reinforcing has been provided as necessary.

3.3. PROTECTION

- 3.3.1. Cover finished surfaces and protect exposed corners and areas vulnerable to damage by persons or by movement of materials, tools or equipment.

END OF SECTION

1. PART 1 – GENERAL

1.1. GENERAL INSTRUCTION

1.2. SUMMARY

- 1.2.1. Section Includes: Provide manual roller window shades including but not limited to following:
 - 1.2.1.1. manually operated roller window sun control shade assemblies.
 - 1.2.1.2. manually operated roller window blackout shade assemblies.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
 - 1.2.2.1. Provision of general LEED® requirements: Section 01 33 29, General LEED® Requirements.
 - 1.2.2.2. Provision of general LEED® Product requirements: Section 01 60 13, LEED® Product Requirements.
 - 1.2.2.3. Waste management and disposal requirements: Section 01 74 19, Waste Management and Disposal.
 - 1.2.2.4. Provision of indoor air quality requirements: Section 01 81 19, Indoor Air Quality Requirements.
 - 1.2.2.5. Provision of gypsum board substrate at bulkhead and accessories: Section 09 21 16, Gypsum Board Assemblies.

1.3. SUBMITTALS

- 1.3.1. Shop Drawings:
 - 1.3.1.1. Submit Shop Drawings for work of this Section in accordance with Section 01 30 00.
 - 1.3.1.2. Submit Shop Drawings which clearly indicate shade sizes, locations, operation, methods of attachment, and description of components, indicating for each component, size, shape, material, thickness, gauge, finish, methods of joining, joint locations, and methods of attachment and relationship with adjacent components and construction, fastening devices, anchorage components and adjacent materials.
- 1.3.2. Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in sizes indicated:
 - 1.3.2.1. Submit sample shade fully representing shades to be provided complete with head rail, end caps, gears, sprocket wheels, brackets and similar accessories. Submit samples of fabrics complete with edge reinforcing and finish colours for selection. Fabric sample minimum 300 mm (12") square. Submit samples of roller shade component colours for review. Roller shade components include but are not limited to fascia, guide rails and blackout channels. Do not order material until colour samples have been accepted.
- 1.3.3. Certificates: Submit written certification that materials, systems and assemblies have been installed in accordance with manufacturer's requirements.
- 1.3.4. Test and Evaluation Reports: Submit test data substantiating proposed shade fabric meets performance criteria specified herein. Submit independent test results showing properties and acceptable fire hazard classification of shade fabric.

1.4. QUALITY ASSURANCE

1.4.1. Qualifications:

- 1.4.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.4.2. Mock-Ups: Erect 1 full size site mock-up of roller window shade at designated location for review. Once reviewed with no objections recorded mock-up sets standard for balance of work. Mock-up may be left as work of this Contract.

1.5. DELIVERY, STORAGE AND HANDLING

1.5.1. Delivery and Acceptance Requirements:

- 1.5.1.1. Deliver materials to site only when work of this Section can be started.
- 1.5.1.2. Before delivery to site verify each assembly for proper operation. Clean each assembly of marks and smudges prior to providing wrap up protective covering.
- 1.5.1.3. Provide necessary crating and bundling for shipment of components to site including protection against weather likely to impair adequacy or appearance of material in finished assembly.

1.6. WARRANTY

- 1.6.1. Manufacturer Warranty: Warrant work of this Section for a period of 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to deformation of members, mechanical failure, failure of system to operate as designed or faulty or poor quality of work.

2. PART 2 – PRODUCTS

2.1. MANUFACTURER

- 2.1.1. Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Altex/G-Line Solar Shading Inc.

2.2. MATERIALS

- 2.2.1. System:

2.2.1.1. Controls

- 2.2.1.1.1. Basis-of-Design Product: District FA75 System
- 2.2.1.1.2. Control Type: Lite Lift Chain operation
- 2.2.1.1.3. Application: Roller solar shades.

2.2.1.2. Fabrication: GL - Stainless steel Operating Chain

- 2.2.1.2.1. Coordinate and verify job site dimensions affecting this work. Submit in writing dimensions or conditions which vary from those on reviewed Shop Drawings or detrimental to installation. Obtain corrective measures from consultant prior to fabrication. Ensure suitability of adjacent building components in relationship to work of this Section.
- 2.2.1.2.2. Submit in writing defects in work prepared under other Sections. Commencement of work implies acceptance of substrates and conditions.
- 2.2.1.2.3. Formed Aluminum: ASTM B221, Aluminum alloy 6063-T5. Ensure surfaces are free from defects impairing appearance, strength and durability.
- 2.2.1.2.4. Roller Window Shade Assembly:
 - 2.2.1.2.4.1. Design and fabricate heavy-duty roller window shade assembly to keep maintenance to minimum.
- 2.2.1.2.5. Roller Tube: Extruded aluminum roller tube to suit assembly design.
 - 2.2.1.2.5.1. Ensure roller tube is sized and reinforced internally as necessary to prevent excessive deflection in span of tube.
 - 2.2.1.2.5.2. Fabric Mounting Spline: Fabricate slipped-in-place spline of extruded vinyl with asymmetrical insertion locking channels and embossed fabric guide. Ensure spline has sufficient capacity to hold shades when spline is slipped and locked into the tube.
- 2.2.1.2.6. Fascia:
 - 2.2.1.2.6.1. 75 mm square fascia system covering the from and bottom in a one piece extrusion.
- 2.2.1.2.7. Shade Fabric Hem Tube:
 - 2.2.1.2.7.1. Hem tube may be extruded aluminum, ellipse in shape, designed to hang perfectly perpendicular and contained within a heat welded fabric pocket. Decorative plastic end caps will be flush to the fabric.

- 2.2.1.3. Finishes:
 - 2.2.1.3.1. Aluminium: Ensure exposed aluminum surfaces are finished (clear anodized)
 - 2.2.1.4. **Basis of design: Lite Lift Roller Shade, District collection with fascia by Altex /G-Line Solar Shading Inc.inc.**
Contact: Albert Giovannoni 416-407-0262 – albert@glineinc.com
 - 2.2.1.5. Substitutions: Not permitted.
- 2.2.2. Fabric:
- 2.2.2.1. General:
 - 2.2.2.1.1. Do necessary cutting and sewing of fabric to produce finished Product having neat, even appearance and meeting performance requirements specified.
 - 2.2.2.1.2. Fabricate shades with no vertical or horizontal seams.
 - 2.2.2.1.3. Ensure fabric tracks perfectly straight in its movement to within $\pm 1\%$ of its width from fully open to fully closed position and when rolled onto tube, ensure it is stacked in layers to within ± 3 mm ($\pm 1/8"$) of edge alignment.
 - 2.2.2.1.4. Fabric Performance: Hang flat shade fabric without buckling or distortion. When trimmed, hang edge straight without ravelling. Ensure unguided roller shade cloth rolls true and straight without shifting sideways more than 3 mm ($1/8"$) in either direction due to wrap distortion or weave design.
 - 2.2.2.2. 3% screen
 - 2.2.2.2.1. 1% Openness Factor screen, Light-Filtering Transparent Fabric: Woven clear view light and glare controlling fabric, basketweave, stain and fade resistant; NFPA 701 TM#1; California US Title 19; CAN/ULC-S109-03 Small & Large Flame Test. PVC coated Fiberglass (36% Fiberglass and 64% Vinyl on Fiberglass core yarn). Microbial Resistance, ASTM E2180 and ASTM G21: Pass. Maximum thickness of 0.017 inches (0.43 mm) $\pm 5\%$. Maximum weight of 11.6 oz. / sq. yd. (393 g/sq. m2) $\pm 5\%$.
 - 2.2.2.2.2. Performances:
 - 2.2.2.2.2.1. Light Transmittance Tv: 4%.
 - 2.2.2.2.2.2. Solar Reflectance Rs: 5%.
 - 2.2.2.2.3. **Basis-of-Design Product: Texscreen 10101-01 – 1% Limestone Privacy Weave**

3. PART 3 – EXECUTION

3.1. EXAMINATION

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2. INSTALLATION

- 3.2.1. Coordinate installation and fastenings with trades providing adjacent components. Coordinate location of support framing and blocking for installation of roller window shades.
- 3.2.2. Install shades in accordance with manufacturer's instructions in accordance with reviewed Shop Drawings and as indicated, in true, flat planes.
- 3.2.3. Securely attach installation fittings to their mounting surfaces with screws of correct length and type and with compatible plugs or anchors where required.

3.3. SITE QUALITY CONTROL

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

3.4. CLEANING

- 3.4.1. Leave shades in raised position at completion of work of this Section.
- 3.4.2. Upon completion of work of this Section, remove Products, materials, debris and equipment from site.
- 3.4.3. Leave site in a neat and tidy condition, acceptable to Consultant.
- 3.4.4. Do touch-up required to satisfaction of Consultant.

END OF SECTION

Part 1 - General

1.01 Summary

- A. This section includes the following types of entrance flooring systems:
 - 1. Floor Grids & Frame Assemblies
- B. Related Sections: The following sections contain requirements related to this section:
 - 1. Grouting frames into recess; refer to sections 03300 "Cast-In-Place Concrete" and section 03600 "Grout"
 - 2. Special requirements of various flooring types; refer to section 09400 "Terrazzo"

1.02 References

- A. American Society for Testing and Materials (ASTM)
- B. The Aluminum Association
- C. The Carpet and Rug Institute (CRI)
- D. The National Floor Safety Institute (NFSI)
- E. International Organization for Standardization (ISO)

1.03 Submittals

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01300.
- B. Product data for each type of floor grid and frame specified, including manufacturer's specifications and installation instructions.
- C. Shop drawings in sufficient detail showing layout of grid and frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors, and accessories.
- D. Samples for verification purposes: Submit an assembled section of floor grid and frame members with selected tread insert showing each type of color for exposed floor grid, frame and accessories required.
 - 1. PediGrid® G1 13" x 6" standard size sample Mill Finish with Castle Gray Carpet
- E. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor grids.

1.04 Quality Assurance

[Specifier note: To maximize the life cycle of the entrance flooring and its appearance, the following items are critical: i) Most S grids are designed for traffic crossing perpendicular to the rail. ii) When designing an entranceway, it is preferable to minimize the need for turning on the grid. iii) We recommend that splices in wider units (above 12') not be positioned in the middle of a door opening wherever possible.]

- A. Flammability in accordance with ASTM E648, Class 1, Critical Radiant Flux, minimum 0.45 watts/m².
- B. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes. *[Specifier note: Slip and fall accidents are a major concern in commercial entranceways. We recommend that approved systems be certified by the manufacturer as meeting a minimum coefficient of friction of 0.60, when tested in wet conditions.]*
- C. Standard rolling load performance is 400 lb./wheel with larger loading requirements as specified (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage). *[Specifier note: For entranceways in businesses such as retail outlets, airports, banks, and casinos, rolling load performance is a critical factor. We recommend that units with the highest practical loading capability be specified for such entrances.]*
- D. Single Source Responsibility: Obtain floor grids and frames from one source of a single manufacturer.
- E. Utilize superior structural aluminum alloys 6105-T5 & 6063-T5 & 6016-T6 for rail components.

F. Utilize a manufacturer that is ISO 9001 & 14001 certified.

1.05 Delivery, Storage and Handling

A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.06 Project Condition

- A. Field measurements: Check actual openings for grids by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- B. Recessed Conditions: IMPORTANT: Coordination with Division 03 00 00 Concrete specifications is required. For proper installation, the concrete recess must be flat and smooth throughout. If the recess is formed by a concrete contractor, the pour dimensions may require leveling grout to achieve the proper depth and a smooth finish. The final recess depth will match the specified product and must be field verified. For proper frame installation, the side walls of the concrete recess must also be straight and smooth. Inconsistencies with the recess and side walls must be remediated prior to product installation.

Part 2 - Products

2.01 Manufacturer

- A. Construction Specialties, 3 Werner Way, Lebanon, NJ 08833 USA 800-233-8493.
email cet@c-sgroup.com
- B. Drawings and specifications are based on manufacturer's literature from Construction Specialties, Inc. unless otherwise indicated. Other manufacturers must be approved equal by Architect/Owner-

2.02 Materials

- A. Aluminum - ASTM B 221, alloy 6105-T5 for rail extrusions and 6005-T5 for key lock bars.
- B. Tread insert options - refer to section 2.05.

2.03 Floor Grids

- A. Model and Description - G1 Pedigrid- Shall be extruded 6105-T5 aluminum alloy tread rails joined mechanically by extruded 6005-T5 aluminum alloy key lock bars. (welding or bolting shall not be permitted.) Rail finish to be mill (standard) or one of other optional colors as offered by manufacturer. Choose from anodized or heavy-duty powder coat finish.

2.04 Grid Frames

(Specifier to select one below and delete others)

- A. DP – Deep Pit Series w/ Drain Pan Frame shall be 4-3/16" (106.4mm) deep with 1/2" (12.7mm) exposed surfaces in 6063-T5 aluminum alloy. These assemblies shall rest upon a continuous TPE cushion with additional support members 32" (0.81m) on center maximum. At every 24" (0.61m) along the support member, staggered side to side, is a 6063-T5 aluminum alloy adjustable support leg. A 16-gauge aluminum pan complete with a 2" (50.8mm) I.P.S. drain and stainless-steel strainer to be provided by manufacturer. A 2" (50.8mm) pipe and drain trap shall be furnished under the plumbing contract. Frame color shall be supplied in mill (standard) or one of other optional colors as offered by manufacturer. Choose from anodized or heavy-duty powder coat finish. Note: Mill finish frames in contact with wet concrete to be primer coated. Rolling load capacity for this application is 300 lb./wheel.

2.05 Tread Insert Options

- A.** HD – MonoTuft HD™ Carpet shall meet CRI standard for good indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Available in standard colors as offered by manufacturer. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. Anti-static carpet fibers shall contain antimicrobial additive and be treated with Scotchgard® to reduce soiling. Carpet weight shall be 33-oz./yd².

Part 3 - Execution

3.01 Examination

- A.** Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1.** Do not proceed until unsatisfactory conditions have been corrected.

3.02 Preparation

- A.** Manufacturer shall offer assistance and guidance to provide a template of irregular shaped grid assemblies to ensure a proper installation.

3.03 Installation

- A.** Install the work of this section in strict accordance with the manufacturer's recommendations.
- B.** Set grid at height recommended by manufacturer for most effective cleaning action.
- C.** Coordinate top of grid surfaces with bottom of doors that swing across to provide ample clearance between door and grid.

3.04 Cleaning

- A.** It is important to the life cycle of the entrance mat that a maintenance schedule be developed which includes regular vacuuming and extraction that correctly matches the amount of traffic the flooring system incurs.

3.05 Protection

- A.** After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.
- B.** Defer installation of flooring systems until time of substantial completion of project.

END OF SECTION