

**SPECIFICATIONS
VOLUME 1 of 1**

PROJECT: VK GREER PS DOOR REPLACEMENT

OWNER: TRILLIUM LAKELANDS DISTRICT SCHOOL BOARD

**CONSULTANTS
ARCHITECT:** LENNOX ARCHITECTS LIMITED
24 MORGAN HEIGHTS DRIVE
HUNTSVILLE, ONTARIO P1H 1B7
TEL: 705-789-8960

ELECTRICAL: HL ENGINEERING
7725 BIRCHMOUNT ROAD, UNIT 46
MARKHAM, ON L3R 9X3
TEL: 905-713-0003

DOOR HARDWARE: SPYDER SC
26 Dale Crescent
Cookstown, ON L0L 1L0
TEL: 905-909-8880

CONSULTANT'S PROJECT NOS: #26003

DATE: May 21, 2026
Issued for Tender

PART 1 – THE CONSULTANTS

1.1 PRIME CONSULTANT (ARCHITECT)

Lennox Architects Limited
24 Morgan Heights Drive
Huntsville, ON,
P1H 1B7

Phone: 705.789.8960
Email: susan@lennoxarchitects.com

1.2 ELECTRICAL CONSULTANTS

HL Engineering
7725 Birchmount Road, Unit 46
Markham, ON,
L3R 9X3


Phone: 905.713.0003
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1.3 HARDWARE CONSULTANTS

Spyder SC
26 Dale Crescent
Cookstown, ON
L0L 1L0

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END OF SECTION

CATEGORY	SEAL & SIGNATURE
<p>ARCHITECTURAL</p> <p>This seal governs all Documents and Sections of these Specifications, except for Section 00 31 19 Existing Conditions and all Divisions/Sections listed below.</p>	 <p>The seal is circular with a dotted border. The text 'ONTARIO ASSOCIATION' is curved along the top, 'OF ARCHITECTS' is in the center, and 'SUSAN LENNOX LICENCE 7748' is at the bottom. A signature is written across the center.</p>

END OF SECTION

VOLUME 1 OF 1

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PART 1 – GENERAL

1.1 GENERAL

- .1 A survey has been carried out concerning existing building conditions, reports for which are included in the TLDSB Tender Documents.
- .2 Reports are hereby offered in good faith for general information and guidance. The Consultant assumes no responsibility for accuracy and completeness of the information provided.
- .3 Contractor shall not be entitled to extra payment and/or performance time for conditions which are identified in the reports.
- .4 In case of discrepancies between recommendations contained in reports and requirements of Contract Documents, the latter shall govern. Advise Consultant in writing of any discrepancies discovered.

END OF SECTION

PART 1 – GENERAL**1.1 SPECIFICATION FORMAT**

- .1 Specifications are addressed to the Contractor. Specifications are not intended as detailed descriptions of installation methods but serve to indicate particular requirements in completing the Work.
- .2 Where Contract Documents do not provide sufficient information for complete installation of item, then as a supplement, comply with manufacturer's written instructions for quality of work.
- .3 Portions of 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.
- .4 Drawings, Lists or Schedules of Items are intended to show scope and arrangement of work. For location of item described refer to such Drawings, Lists or Schedules unless location stipulated in Specifications.

1.2 DIVISION OF WORK

- .1 Work specified in the Specification has been divided into technical Sections for the purpose of ready reference. Division of work among Subcontractors and suppliers is solely the Contractor's responsibility and Consultant assumes no responsibility to act as an arbiter to establish subcontract limits between Sections or Divisions of work.

1.3 METRIC PROJECT

- .1 This project is based on The International System of Units (SI). Measurements are expressed in metric (SI) units and depending on the progress made in the various sectors of the industry are either hard or soft converted units.
- .2 All metric units specified shall be taken to be the minimum acceptable unless otherwise noted.
- .3 It is the Contractor's responsibility to check and verify with manufacturers and suppliers on the availability of materials and products in either metric or imperial sizes.
- .4 Where a material or product cannot be obtained in the metric size specified, provide the next larger imperial size available.
- .5 Where both metric and imperial sizes or dimensions are shown, the metric size or dimension shall govern.

1.4 DISCREPANCIES/CONFLICTS/OMISSIONS

- .1 If discrepancies or conflicts in, or omissions from Drawings, Specifications or other Contract Documents are suspected, or if there is doubt as to meaning or intent thereof, notify Consultant at once. Where there is conflict between Contract Documents, the most stringent requirement shall prevail.
- .2 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 Consultant at once.
- .3 Comply with Consultant's written instructions or explanations.
- .4 Promptly and not later than within 10 Working Days of becoming aware of circumstances which may require a change in the Work or other directions, give written notice to Consultant outlining such circumstances and request written directions. Do no work in affected area, or that would prevent Consultant from properly assessing situation or evaluating change, without its prior written approval. Consultant will act promptly to give Contractor directions so the Work is not unreasonably delayed.

1.5 PRE-CONSTRUCTION MEETING

- .1 Immediately prior to construction, upon notification attend at location of Owner's choice, pre-construction meeting, along with authoritative representatives of certain key subcontractors as directed by Consultant.
- .2 Purpose of meeting is as follows:
 - .1 Review project communications procedures.
 - .2 Review contract administration requirements including submittals, payment and change order procedures.
 - .3 Identify all critical points on construction schedule for positive action.
 - .4 Identify any product availability problems and substitution requests.
 - .5 Establish site arrangements and temporary facilities.
 - .6 Review Consultant's inspection requirements.
 - .7 Review any points which, in Owner's, Consultant's and Contractor's opinion, require clarification.
- .3 The Consultant shall organize and chair the pre-construction meeting. Consultant shall record minutes of pre-construction meeting and distribute a copy to each participant within ten days of meeting.

1.6 SITE MEETINGS

- .1 Prior to the commencement of the Work, the Contractor together with the Consultant shall mutually agree to a sequence for holding regular bi-weekly Contractor run site meetings.
- .2 The Contractor to organize and chair site meetings. Ensure that persons, whose presence is required, are present and that relative information is available to allow meetings to be conducted efficiently.
- .3 Once a month, or more often if directed by Consultant, include review with Consultant and Owner of construction schedule and application for progress payment, during or immediately following site meeting.
- .4 Record minutes of each meeting and promptly distribute copies to be received by all participants not later than seven days after meeting has been held. Distribute minutes of meetings to all Consultants, whether in attendance or not.

1.7 SUPERVISION

- .1 Employ an experienced and qualified full time site supervisor who shall be in complete charge of the Work from commencement to final completion of the Work and who shall be present at the site whenever work is being carried out. A working foreperson will not be acceptable. The supervisor shall not be changed after commencement of work without the Consultant's approval.
- .2 Supervise, direct, manage and control the work of all forces carrying out the Work, including subcontractors and suppliers. Carry out daily inspections to ensure compliance with the Contract Documents and the maintenance of quality standards. Ensure that the supervisory staff includes personnel competent in supervising all Sections of Work required.
- .3 Arrange for sufficient number of qualified assistants to the supervisor as required for the proper and efficient execution of the Work.

1.8 DOCUMENTS ON SITE

- .1 Contractor's field office shall at all times contain a complete set of Contract Documents (Drawings and Specifications) with all addenda, site instructions, change orders, reviewed shop drawings and samples, colour schedule, paint materials schedules, hardware list, progress reports and meeting minutes.

1.9 SCHEDULING

- .1 Base sequence and scheduling of construction on maintaining continuous operation and access to the Work during construction.
- .2 Phase construction as described herein. Notify Owner in writing 7 Days prior to beginning work in an occupied area. Owner will accommodate request within 7 Days of notification. Co-ordination with authority at the Place of the Work is crucial. Submit a progress schedule before commencement of the Work. Coordinate any suggested changes to schedule with Owner. Ensure schedule includes adequate time for Product delivery and Shop Drawing preparation, review and resubmission.

- .3 Allow for un-schedule interruption to schedule of the Work and suspend parts of the Work affected to permit Owner to relocate furniture and equipment from Place of the Work, into finished spaces. Owner will coordinate this interruption.

1.10 INCLEMENT WEATHER AND COLD WEATHER WORK

- .1 Take precautions during inclement weather and provide adequate protection.
- .2 Continue the Work, including winter months, if applicable, until the Work is completed and accepted.
- .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.

1.11 OWNER OCCUPANCY

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

1.12 PLACE OF THE WORK

- .1 Confine extent of construction activities to area indicated on Drawings as Place of the Work and/or within area defined by property lines. Confine all equipment, materials, debris, offices, storage sheds and storage areas to area previously defined.
- .2 Contractor to provide all storage containers required for construction materials and debris. Locations of containers to be approved by the client prior to installing on site.
- .3 Contractor has complete and exclusive use of Place of the Work for performance of the Work. Assume responsibility for premises assigned, for performance of the Work.
- .4 Should Contractor require that boundaries of Place of the Work be temporarily extended, obtain approval of Consultant.
- .5 Certain restrictions are specified as to use by Contractor of various portions of 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 Owner.
- .6 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.

1.13 DEMOLITION, SECURITY AND ACCESS

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

1.14 SITE DIMENSIONS

- .1 Before proceeding with Shop Drawings, fabrication, or supply of each new part of the Work, examine installed parts of the Work and verify as-built site dimensions to coordinate previously built construction with pending construction.

1.15 EXISTING AREAS AND WORK OF OTHER CONTRACTORS

- .1 Commencement of parts of the Work, in existing areas and in areas provided by Other Contractors, will be deemed to signify Contractor's acknowledgment and acceptance of those parts of the Work.
- .2 Immediately report defects, which affect quality and performance of the Work, in writing to Consultant.
- .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.
- .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 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.
- .5 Maintain temporary entrances to building(s) 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. Bridge excavations with construction to safely support any load that could be imposed or provide personnel to assist in deliveries to building(s) as required.

1.16 SECURITY AND SAFETY REGULATIONS

- .1 Execute the Work in accordance with following security requirements and regulations.
- .2 Be responsible for security of all areas affected by work of this Contract until taken over by Owner. Take steps to prevent entry to the Work by unauthorized persons and guard against theft, fire and damage by any cause.
- .3 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.
- .4 Perform the Work between hours of 7:30 a.m. and 7:00 p.m., Monday to Friday unless directed otherwise by the Client. Obtain prior written approval to do work on other Days and times.
- .5 Owner will provide security escort for the Work in locations it deems necessary.
- .6 Owner may issue suitable keys to Contractor, where possible. 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 Owner immediately upon request.
- .7 Direct enquiries regarding security regulations to Owner, who will advise Contractor of any additional requirements.
- .8 Maintain fire protection for work. Store paints and volatile substances in a separate and controlled location and inspect frequently. Inspect temporary wiring, drop cords, extension cables for defective insulation or connections frequently. Remove combustible wastes frequently.
- .9 Do not cut, bore or sleeve through any loadbearing member, new or existing without Consultant's written authorization, unless specifically indicated on Drawings.

1.17 TEMPORARY SHUT DOWNS OF CONSTRUCTION OPERATIONS

- .1 Contractors and Subcontractors shall be aware at all times that ongoing functions and activities of existing facility will continue. Owner may at any given time request that any work of Contract be temporarily ceased.
- .2 Temporary reasonable shut downs and interference are for emergency and/or sensitive health and security reasons and they shall not be construed as cause of elimination or restriction of Contractor's Working Schedule, claims for delay of Work, nor additional costs.
- .3 Contract Price shall include and allow for such temporary shut downs.

1.18 NO SMOKING POLICY

- .1 Cooperate, respect and comply with Smoke Free Workplace policy requirements of Place of the Work. This policy applies to everyone who visits and works on this Project.
- .2 Ensure Contractor's staff, Subcontractors and Suppliers performing work on site on Contractor's behalf are instructed to comply with Smoke Free Workplace policy requirements.

END OF SECTION

PART 1 – GENERAL**1.1 DEFINITION**

- .1 Comply with GC 4.1 Cash Allowance.
- .2 Cash allowances are designated for additional work and services deemed to be necessary by Owner, from time to time, throughout the execution of the Work. Where a cash allowance refers to an item or category of work already included in Contract Documents, it shall be assumed to cover work or services in addition to that indicated, unless specifically indicated otherwise.
- .3 Contractor may be required from time to time to assist in tendering of certain items of work covered by allowance, as directed by Consultant.

1.2 AUTHORIZATION

- .1 Expenditures from allowances included in the Contract must be authorized in writing by the Consultant.
- .2 Work covered by allowances shall be performed for such amounts and by such persons as directed by the Consultant.

1.3 CASH ALLOWANCE

- .1 Cash allowances include supply and installation unless specifically indicated otherwise.
- .2 Supply only allowances shall include:
 - .1 Net cost of products
 - .2 Delivery to site
 - .3 Applicable taxes and duties (excluding HST)
- .3 Supply and install allowances shall include:
 - .1 Net cost of products
 - .2 Delivery to site
 - .3 Unloading, storing, handling of products on site
 - .4 Installation, finishing and commissioning of products
 - .5 Applicable taxes and duties (excluding HST)
- .4 Inspection and testing allowances shall include:
 - .1 Net costs of inspection / testing services
 - .2 Applicable taxes (excluding HST)
- .5 Other costs related to work covered by allowances are not covered by the allowance but shall be included separately in Contract.

.6 .1 The following cash allowance amounts are to be carried for the project is (excludes HST):

.1 Security: Five Thousand Dollars (\$5,000)

END OF SECTION

PART 1 – GENERAL

1.1 DEFINITION

- .1 Comply with GC 4.2 Contingency Allowance.
- .2 Contingency allowances are designated for additional work and services deemed to be necessary by Owner, from time to time, throughout the execution of the Work.
- .3 Contractor may be required from time to time to assist in tendering of certain items of work covered by allowance, as directed by Consultant.

1.2 AUTHORIZATION

- .1 Expenditures from allowances included in the Contract must be authorized in writing by the Consultant.
- .2 Work covered by allowances shall be performed for such amounts and by such persons as directed by the Consultant.

1.3 CONTINGENCY ALLOWANCE

- .1 The following contingency allowance amounts are to be carried for the project is (excludes HST):
 - .1 Five Thousand Dollars (\$5,000)

END OF SECTION

PART 1 – GENERAL**1.1 CONSTRUCTION SCHEDULE**

- .1 Within 5 days of Contract award, submit in format acceptable to Consultant, minimum four copies of Contractor's critical path construction schedule, using suitable computer scheduling software, such as "MS Project" or "Primavera".
- .2 Schedule proposed by the Contractor shall be based on the following assumptions:
 - .1 Critical path base line is considered by Contractor as reasonable and achievable.
 - .2 Schedule is based on resources which have been committed for this project by Contractor and will be readily available when needed.
 - .3 Schedule is based on normal range of weather conditions, as documented by official weather records.
 - .4 Float belongs to Project.
- .3 Set up format to permit plotting of actual construction progress against scheduled progress.
- .4 Schedule shall show:
 - .1 Commencement and completion dates of Contract.
 - .2 Commencement and completion dates of construction stages/phases, if any.
 - .3 Commencement and completion dates of each trade. Major trades shall be further broken down as directed by Consultant; generally follow Specification format.
 - .4 Order and delivery dates for major or critical equipment.
 - .5 Critical dates for shop drawing/sample submissions.
 - .6 Any other information relating to orderly progress of Contract, considered by Contractor or Consultant to be pertinent.
- .5 Submit copy of schedule showing actual progress, to Consultant once a month, concurrently with application for payment. Consultant, together with Contractor, shall review construction progress once a month during or immediately following regular site meeting, or more often as directed by Consultant.
- .6 Update construction schedule, whenever changes occur, in manner and at times acceptable to Consultant. Include with each update a written report of activity progress reflected in the revised critical path schedule, and the corrective actions which have been or are to be taken to maintain progress on the schedule in the future, anticipated delay, resource availability, schedule changes, and work to be completed in the next 2 month period.
- .7 Plot actual construction progress on schedule at least once a week.

1.2 CASH FLOW CHART

- .1 Within 5 days after award of Contract, submit, in form approved by Consultant, cash flow chart broken down on a monthly basis in an approved manner. Cash flow chart shall indicate anticipated Contractor's monthly progress billings from commencement of work until completion.
- .2 Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to the Consultant.

1.3 PROGRESS RECORD

- .1 Maintain on site, permanent written record of progress of work. Record shall be open to inspection by Consultant at all times and copy shall be furnished to Consultant upon request.
- .2 This record shall show weather conditions, dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete, installation of roofing and other critical or major components as well as number of employees of various trades and type and quantity of equipment employed daily, shall be noted.
- .3 Display a copy of the construction schedule in the site office from start of construction to completion. Superimpose actual progress of work on schedule at least once each week.

1.4 AS-BUILT DRAWINGS

- .1 Obtain and keep on site at all times a complete and separate set of black line white prints.
- .2 Note clearly, neatly, accurately and promptly as the work progresses location of services, piping, conduits, ductwork embedded in concrete/masonry and location and depth of underground services below building.
- .3 As-built drawings shall be available for review at each site meeting.
- .4 Refer to Section 01 77 00 for requirements on submission of as-built drawings.

1.5 PRODUCT DELIVERY CONTROL

- .1 It is the responsibility of the Contractor to ensure that the supplier or distributor of materials specified or alternatives accepted, which he intends to use, has materials on the site when required. The Contractor shall obtain confirmed delivery dates from the supplier.
- .2 Provide equipment delivery schedule, coordinated with construction and submittals' schedule, showing delivery dates for major and/or critical equipment.
- .3 The Contractor shall contact the Consultant immediately upon receipt of information indicating that any material or item, will not be available on time, in accordance with the original schedule, and similarly it shall be the responsibility of all subcontractors and suppliers to so inform the Contractor.
- .4 The Consultant reserves the right to receive from the Contractor at any time, upon request, copies of actual purchase or work orders of any material or products to be supplied for the work.

- .5 If materials and products have not been placed on order, the Consultant may instruct such items to be placed on order, if direct communication in writing from the manufacturer or prime suppliers is not available indicating that delivery of said material will be made in sufficient time for the orderly completion of the Work.
- .6 The Consultant's review of purchase orders or other related documentation shall in no way release the Contractor, or his subcontractors and suppliers from their responsibility for ensuring the timely ordering of all materials and items required, including the necessary expediting, to complete the work as scheduled in accordance with the Contract Documents.

1.6 PROGRESS PHOTOGRAPHIC DOCUMENTATION

- .1 Contractor to provide to the Consultant a daily photographic documentation report for the progress of windows, framed entrances and storefront work at the following key stages:
 - .1 Removal of existing screens, doors and windows;
 - .2 Removal of vapour barrier and insulation;
 - .3 Installation of insulation;
 - .4 Installation of blue skin.
- .2 Contactor's photographs are to be in pdf format, labeled by room, be clear and of a scale that allows viewing of the specific conditions.
- .3 Contractor to identify any unforeseen existing conditions discovered during the four stages of documentation when the photos are emailed to the Consultant.
- .4 Contractor to provide a floor plan is to accompany the photos to identify the room name and day work completed.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL**

- .1 Unless specified or directed otherwise, make all submissions to the Consultant at his office.
- .2 Make all submissions required by the Contract Documents with reasonable promptness and in orderly sequence so as to cause no delay in the work.
- .3 Arrange and pay for delivery to and return from Consultant of all submittals.

1.2 RELATED REQUIREMENTS

- .1 Make the following submissions in accordance with requirements specified elsewhere:
 - .1 Applications for payment: General Conditions of the Contract
 - .2 WSIB certificates of clearance: General Conditions of the Contract
 - .3 Insurance certificates: General Conditions of the Contract
 - .4 Bonds: General Conditions of the Contract
 - .5 Construction schedule: Section 01 32 00
 - .6 Cash flow chart: Section 01 32 00
 - .7 Maintenance and operations data: Section 01 77 00
 - .8 As-built drawings: Section 01 77 00
 - .9 Maintenance materials: Section 01 77 00

1.3 SCHEDULE OF VALUES

- .1 Submit schedule of values in accordance with requirements of GC 5.2 APPLICATIONS FOR PROGRESS PAYMENT.
- .2 Follow specifications table of contents as basis for degree of breakdown required. Show breakdown for different construction phases/stages if required by Consultant.
- .3 Break down cost for large items of work as directed by Consultant.
- .4 Provide additional cost breakdown information if requested by Consultant.

1.4 SCHEDULE OF SUBMITTALS

- .1 Within 10 days of submission of construction schedule submit a schedule of submittals for shop drawings, samples, lists of materials and other documentation requiring Consultant's review.

- .2 For each item requiring submission and review show anticipated date of submission and critical date for return of reviewed submission.
- .3 Design sequence of submissions to reflect requirements of construction schedule.
- .4 Allow up to 10 days for Consultant's review for each submission. Stagger submissions as much as possible to permit adequate review time for each item submitted. If several submissions are made at the same time or within a short time of each other, indicate order of priority in which submissions should be reviewed.
- .5 Include sufficient time to permit corrections and resubmission, if necessary, without affecting construction schedule.

1.5 PRODUCT DATA

- .1 Submit product data sheets, required by Contract Documents, and others as may be reasonably required by Consultant.
- .2 Submit product data sheets in digital or printed hardcopy form and in accordance with the following requirements:
 - .1 Show detailed comprehensive information on products to be used.
 - .2 Clearly identify product/model number on data sheets containing multiple products.
 - .3 Supplement manufacturers/distributor's standard schematics, diagrams, brochures data sheets, catalogue sheers, charts and other descriptive data as required to give a clear understanding of the properties of the product and how product is to be incorporated into project.

1.6 SHOP DRAWINGS

- .1 Submit shop drawings required by Contract Documents, in accordance with requirements of GC 3.11 SHOP DRAWINGS.
- .2 Prepare shop drawings in metric measurements only. Shop drawings containing imperial measurements will be rejected.
- .3 Provide shop drawings bearing seal and signature of professional engineer licensed to practice in Ontario where required. Shop drawings submitted without required seal and signature will be rejected and returned to Contractor without review.
- .4 Contractor to set up an online account (dropbox or similar) and upload a digital copy for each shop drawing required. Email notification of the upload to be sent to all applicable consultants.
- .5 After review, Consultant will return the marked up digital copy to the Contractor. Contractor shall be responsible for the distribution of reviewed shop drawings as required.

- .6 Shop drawings which require the approval of a legally constituted authority having jurisdiction shall be submitted by Contractor to such authority for approval. Such shop drawings shall receive final approval of authority having jurisdiction before Consultant's final review.
- .7 No work requiring a shop drawing submission shall be commenced until the submission has received Consultant's final review. Do not use any shop drawing, erection drawing or setting drawing which does not bear the stamp and signature of the Consultant.
- .8 The Consultant's review is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and this review shall not relieve the Contractor of his responsibility for meeting the requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all subtrades.

1.7 SAMPLES AND MOCK UPS

- .1 Submit samples and provide mock ups as required by Contract Documents and as directed by the Consultant.
- .2 Unless indicated otherwise submit samples in duplicate.
- .3 Where colour selection is required submit manufacturer's full colour range for specified product line.
- .4 Submit samples with identifying labels bearing material or component description, manufacturer's name and brand name, Contractor's name, project name, location in which material or component is to be used, and date.
- .5 Prepay any shipping charges involved for delivering samples to destination point and returning to point of origin if required.
- .6 No work requiring a sample submission shall be commenced until the submission has received Consultant's final review.

1.8 REQUESTS FOR INFORMATION (RFI'S)

- .1 Submit RFI's only after a thorough review has determined that the required information is not included in the Contract Documents.
- .2 Submit sequentially numbered RFI's in a timely manner so as not to cause any delay and leaving sufficient review time for the Consultant.
- .3 RFI's are required to identify the question and propose a possible solution for consideration.
- .4 The Consultant will identify each RFI with the time and date received and assign an anticipated review time of one to five working days depending on the complexity of the matter under review, applied consecutively.

- .5 The Consultant will review RFI's in the order received, unless, upon Contractor's request, the Consultant agrees to prioritize the review of a particular RFI, adjusting the review time accordingly.
- .6 The consultant will advise the Contractor within the assigned review time with one of the following responses:
 - .1 Information requested is included in the Contract Documents.
 - .2 A site instruction will be issued.
 - .3 A change notice will be issued.
 - .4 A change directive will be issued.

1.9 CHANGES IN THE WORK

- .1 When a change in the Work is proposed or required, the Consultant will provide the Contractor with a written description of the proposed change in the Work. The Contractor shall promptly present, in a form acceptable to the Consultant, an amount of adjustment for the Contract Price, if any, and the adjustment in the contract time, if any, for the proposed change in the Work.
- .2 Allowance for overhead and profit shall be as per the CCDC and as per the Trillium Lakelands District School Board's Supplementary Conditions.
- .3 The costs for the following items shall be considered to be included in the allowance for overhead and profit and may not be charged separately.
 - .1 Contractor's head office expenses, including estimating and accounting services.
 - .2 Wages of project managers, superintendents, assistants, watchpersons and administrative personnel.
 - .3 Temporary site office including costs for telephone, facsimile machine and internet equipment.
 - .4 Small tools.
 - .5 Insurance and bonding premiums.
 - .6 Construction safety program.
 - .7 Shop drawings, record drawings and interference drawings.
 - .8 Clean up and disposal of waste materials.

1.10 ELECTRONIC DOCUMENT FILES

- .1 Apply and pay for electronic documents in accordance with "Electronic Document Transfer Request" form, attached to this Section.

END OF SECTION



24 MORGAN HEIGHTS DRIVE
 HUNTSVILLE, ON, P1H 1B7
 T 705 789 8960
 W www.lennoxarchitects.com

Electronic Document Transfer Request All Disciplines

Project Name:	
Project No.:	
Date:	
Company requesting files:	
Person requesting files:	
Intended use of files	
Description of files:	

1. The requested electronic file(s) (the "Files") remain the property of the applicable consultant (Lennox Architects Limited and HL Engineering) including all copyright therein.
2. There is no warranty expressed or implied, that the intended use of the Files will meet the business purpose of the Company receiving the Files or that the Files represent or reflect the complete scope of work.
3. Company receiving the Files shall indemnify and hold the consultant harmless from any claims or damages arising from the use of the Files in the execution of the work.
4. In the event that drawing files transferred contain consultant title block, permits or professional seals, the Files shall be immediately returned to consultant and all copies thereof destroyed.
5. The Company receiving the Files is not permitted to alter or revise the Files, including the drawings or the scope of work, unless authorized in writing by the consultant.
6. No use shall be made of the Files for any purpose other than the one stated above, without the written consent of the consultant.
7. No retransmission of the Files, or parts thereof, in any form to any third party is permitted unless authorized in writing by the consultant.
8. Any data contained in the Files, including the internal file structure, etc., is the property of the consultant. and shall be kept confidential by the recipient.
9. The Undersigned agrees to pay the consultant a fee per project of **\$100 per discipline set** (plus HST). The fees noted are to cover the cost of preparation of the Files. By paying the fee quoted, the Company receiving the Files has in no way acquired any rights to the Files or the drawings or the information contained therein.

Having read and understood the above, the undersigned agrees to be bound by the terms hereof.

 Signature of Company's Authorized Representative

 Date

The above requested files will only be released upon receipt by Lennox Architects Limited of an **original of this form** signed by a duly authorized representative of the company requesting the files along with the **cheque payable to the applicable consultant** in the amount consistent with note 9 above. The consultants reserves the right to deny any request for copies of electronic files.

PART 1 – GENERAL**1.1 SUMMARY**

- .1 Section Includes:
 - .1 Requirements for protection of existing facilities during construction operations.
 - .2 Storage of materials
 - .3 Demolition and removals of building elements.
 - .4 Progress photos documentation procedures.
 - .5 Products and installation for patching and extending Work within construction areas of existing facilities.
 - .6 Providing transitions and adjustments.
 - .7 Repair of damaged surfaces and finishes.
 - .8 Encountering Hazardous materials procedures.

1.2 QUALITY ASSURANCE

- .1 Conform to Ontario Building Code, Ontario Occupational Health and Safety Act and all other Standards and Regulations noted.
- .2 All work performed and materials used shall be of the same standard of quality as that of the existing finished building as a minimum level of acceptance.
- .3 Any welding shall be performed by Welders certified in accordance with CSA W47, and shall conform to CSA W59.

1.3 OCCUPANCY, ACCESS, PROTECTION AND STORAGE

- .1 Entire existing facility will be occupied and in full operation during execution of this Work.
- .2 Contractor is required to provide storage containers for all construction materials and debris. Coordinate with the Owner for locations.
- .3 When necessary to perform the Work, the Owner will issue keys to existing mechanical/electrical equipment spaces. Contractor to return the keys at the end of the warranty period.
- .4 Contractor to exercise every precaution to ensure safety and protection for existing facilities, occupants, merchandise, pedestrians and vehicles. The following must meet required codes and accessibility requirements:
 - .1 Maintain safe access and egress at all times for occupants, pedestrians and vehicles.
 - .2 Provide protection to prevent damage to facilities, merchandise, and vehicles from dust, water, weather and other similar harmful elements.

- .3 Maintain exiting from facilities to provide safe passage complying with applicable codes.

1.4 SCHEDULING OF WORK

- .1 Make arrangements with the Owner and schedule the Work to avoid interference with normal operations of occupied areas. Submit a schedule and summary of applicable Work within occupied areas and obtain Owner approval not less than two days prior to commencement of such Work.
- .2 Requests for use of certain existing loading docks, passage ways and other similar spaces within areas outside limits of construction operations will be limited to day-by-day basis and must be approved in advance by the Owner.
- .3 Coordinate access with scheduling of Work within tenant areas with the Owner.

1.5 UTILITY SERVICE OUTAGES

- .1 Contractor to keep utility and service outages to a minimum and perform only after written approval of the Owner is received.
- .2 Make requests to the Owner for outages a minimum of two (2) calendar days in advance of the proposed outage.
- .3 Contractor is responsible for investigating utility and service lines to determine the effect of a scheduled outage on building operations outside of the limit of the Work.

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Use products of types and construction that exist currently as needed to patch, extend or match existing Work.
 - .1 Contract documents do not define products or standards of workmanship present in the existing construction.
 - .2 Determine by inspecting and testing products where necessary, referring to existing work as the quality standard.
- .2 New Materials to comply with Specifications for each product involved.
- .3 When material is not readily obtainable on the current market, salvaged sufficient quantities of cut or removed material to replace damaged Work of existing construction. Store salvaged material in a dry, secure space on site until reinstallation.

PART 3 – EXECUTION

3.1 EXAMINATION

- .1 Verify existing conditions to determine that all areas meet constructability and are ready for alteration and remodeling as per the contract documents.

- .2 Contractor shall notify the Consultant of any discrepancies prior to commencing the Work.

3.2 PREPARATION

- .1 Construct temporary fire-rated partitions to separate existing occupied areas from construction and alteration areas.
- .2 Cut, move or remove items as necessary for access to alteration and renovation Work.
- .3 Cutting and removal work shall be performed so as not to cut or remove more than is necessary and in a manner to avoid damage to adjacent work. Cut finish surfaces such as masonry, tile, plaster or metals by methods to terminate surfaces in a straight line at a natural point of division.
- .4 Prepare surfaces and remove surface finishes as necessary to provide for proper installation of new material and finishes.
- .5 Close openings in exterior surfaces to protect the existing building from weather, temperature and humidity variations. Insulate ductwork and piping to prevent condensation in exposed areas.
- .6 Provide temporary barriers and closures to control operations to prevent spread of dust to occupied sections of the building.

3.3 PROGRESS PHOTOGRAPHIC DOCUMENTATION

- .1 Contractor to provide to the Consultant a daily photographic documentation report for the progress of windows, framed entrances and storefront work at the following key stages:
 - .1 Removal of existing screens, doors and windows;
 - .2 Removal of vapour barrier and insulation;
 - .3 Installation of insulation;
 - .4 Installation of blue skin.
- .2 Contractor's photographs are to be in pdf format, labeled by room, be clear and of a scale that allows viewing of the specific conditions.
- .3 Contractor to identify any unforeseen existing conditions discovered during the four stages of documentation when the photos are emailed to the Consultant.
- .4 Contractor to provide a floor plan to accompany the photos to identify the room name and day work completed.

3.4 HAZARDOUS MATERIALS PROCEDURES

- .1 Refer to the Asbestos Survey in Section 00 31 19 for the anticipated existing condition details.
- .2 If materials are encountered that are suspected to be lead, PCB, asbestos, contain asbestos or any other hazardous material, the Contractor shall immediately notify the Owner and take precautions as required to avoid disturbing materials until directed by the Owner.

- .3 When removing asbestos or silica board fireproofing comply strictly with health and safety regulations. Bag material and dispose of in accordance with regulations. Enforce use of breathing masks during cleaning operations.

3.5 INSTALLATION

- .1 Carefully perform demolition and removals in such a manner to insure safety in handling and to prevent damage to construction and materials indicated to remain. Provide shoring, bracing and other temporary measures as required to maintain safe conditions.
- .2 Remove, cut and patch Work in a manner to minimize damage and to provide means of restoring products and finishes to specified conditions.
- .3 Install products as specified in individual Specification Sections.
- .4 Where new Work abuts or aligns with existing, perform smooth and even transition to match existing adjacent surfaces in texture and appearance.
- .5 When finished surfaces are cut so that a smooth transition with the new Work is not possible, terminate existing surface along a straight line and request instructions from the Consultant as to methods of making the transition.
- .6 Where there is an extreme level change (>50mm), obtain instructions from the Consultant for transition methods ie. Installation of bulkheads, ramping, sloping etc.
- .7 Remove debris promptly from site each day in a safe and legal matter. Do not burn debris on site or allow it to enter the sewers.
- .8 If applicable, TLDSB will remove window roller shades and curtains. Contractor to maintain existing mounting rods, where possible.

3.6 ADJUSTMENTS

- .1 Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls and ceilings to provide smooth surface without breaks, steps or soffits.
- .2 Patch or replace portions of existing surfaces which are damaged, lifted, discoloured or showing other imperfections.
- .3 If the surrounding surface cannot be matched, repaint or recoat the entire surface.
- .4 Trim existing doors as necessary to allow swing clearances for new floor finishes.
- .5 Where the existing ceiling finish is scheduled for removal, include existing suspension system in suspended ceiling systems, existing gypsum backer boards in adhesive-applied acoustical tile installation, and all other ceiling system components as applicable.
- .6 Restore existing work that is damaged during construction to a condition equal to its condition at the time of the start of the Work.
- .7 If any repair work is not equal to the standard of the new Work, the Contractor will be required to cut out and replace with new Work at no additional cost to the Owner.

3.7 CLEANING

- .1 At the end of each day, any spillage, overspray, dust, debris or damage to adjacent Owner occupied spaces shall be cleaned.
- .2 As soon as installation of the Work in each area is complete, clean up all surfaces, remove equipment, salvage debris and return in a condition suitable for use by the Owner.

END OF SECTION

PART 1 – GENERAL**1.1 SUMMARY**

- .1 Section Includes:
 - .1 Permits, Licenses, Fees.
 - .2 Building Code, By-Laws, Regulations.
 - .3 Construction Safety.
 - .4 Fire Protection.
 - .5 Hazardous Materials.
 - .6 Waste Management.

1.1 PERMITS, LICENCES, FEES

- .1 The Contractor shall be responsible for the procurement (including payment) of permits, licences, inspections and certificates, which are necessary for the performance of the Work, not including building permit.
- .2 Where permits, licences and inspection fees are required by authorities having jurisdiction for specific trade functions, they shall be obtained by particular subtrade responsible for that work.
- .3 Review building permit set with Consultant immediately following receipt of building permit and jointly determine whether or not changes to Contract are required.
- .4 Be responsible for ensuring that no work is undertaken which is conditional on permits, approvals, reviews, licences, fees, until all applicable conditions are met. No time extension will be allowed for delay in obtaining necessary permits.
- .5 Report to the Consultant in writing any condition which would prohibit granting of any permit or approval before work affecting such items is commenced.
- .6 Give notice of completion of project prior to occupancy, as required by applicable legislation.

1.2 BUILDING CODE, BY-LAWS, REGULATIONS

- .1 Carry out work in accordance with requirements of the Ontario Building Code, latest issue, including all amendments and revisions.
- .2 Comply with requirements, regulations and ordinances of other jurisdictional authorities.
- .3 Where it is necessary to carry out work outside property lines, such as sidewalks, paving or concrete curbs, comply with applicable municipal requirements.

- .4 Promptly submit written notice to Consultant, of observed variance of Contract Documents from requirements of Building Code and authorities having jurisdiction. Assume responsibility for work known to be contrary to such requirements and performed without notifying Consultant.

1.3 CONSTRUCTION SAFETY

- .1 Be governed by pertinent safety requirements of Federal or Provincial Governments and of municipal bodies having authority, particularly the Ontario Construction Safety Act, and regulations of Ontario Ministry of Labour, and work in conjunction with proper safety associations operating under the authority of Ontario Workplace Safety and Insurance Act.
- .2 Do not, in the performance of the work, in any manner endanger the safety or unlawfully interfere with the convenience of the public.
- .3 Notify the Ontario Ministry of Labour of intended work of this Contract as required by the Occupational Health and Safety Act. One copy of the "Notice of Project" shall be handed to Consultant.

1.4 FIRE PROTECTION

- .1 Refer to technical Sections of Specifications and Drawings for fire protection requirements.
- .2 Test methods used to determine fire hazard classification and fire endurance rating shall be as required by Ontario Building Code.
- .3 Upon request, furnish Consultant with evidence of compliance with project fire protection requirements.
- .4 Materials and components used to construct fire rated assemblies and materials requiring fire hazard classification shall be listed and labelled, or otherwise approved, by fire rating authority. Labelled materials and their packaging shall bear fire rating authorities label showing product classification.
- .5 Fire rated door assemblies shall include doors, frame, anchors and hardware and shall bear label of fire rating authority showing opening classification and rating.
- .6 Materials having a fire hazard classification shall be applied or installed in accordance with fire rating authority's printed instructions.
- .7 Fire rated assemblies shall be constructed in accordance with applicable fire test report information issued by fire rating authority. Deviation from fire test report will not be allowed.
- .8 Construct fire separations as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from floor to underside of structural deck above.
- .9 Fill and patch voids and gaps around openings and penetrations in and at perimeter of assemblies so as to maintain continuity and to produce a fire resistant smoke tight seal, acceptable to jurisdictional authorities and Consultant.

1.5 HAZARDOUS MATERIALS

- .1 Comply with provisions of the Occupational Health and Safety Act as amended to include WHMIS (Workplace Hazardous Materials Information System).
- .2 Ensure that Material Safety Data Sheets (MSDS) are available on site prior to first delivery to site of any controlled material or substance.
- .3 Maintain on site for duration of Contract a hazardous materials log containing all required MSDS.
- .4 Log shall be open for inspection for City, Consultant and all personnel on site.
- .5 Ensure that workers are instructed in the purpose and content of MSDS.

1.6 WASTE MANAGEMENT

- .1 Comply with applicable regulations federal, provincial and municipal authorities governing waste management.
- .2 Prepare and submit waste audit, waste reduction and source separation plans in accordance with applicable regulatory requirements.

END OF SECTION

1.1 GENERAL

- .1 Provide all temporary facilities and controls required for the proper execution of the work.
- .2 Provide and maintain temporary systems in accord with applicable regulations and requirements. Arrange for, obtain and pay for any permits required.

1.2 TEMPORARY ELECTRICITY & LIGHTING

- .1 Provide temporary electrical lighting and power system (either temporary power line by local hydro utility or diesel generators) for use by all Sections.
- .2 Arrange, obtain and pay for service, including meter, of sufficient size to allow use of required tools and equipment and to ensure adequate lighting levels for the proper execution of work.
- .3 Install and maintain temporary electrical systems in accordance with the Ontario Electrical Code and other authorities having jurisdiction.

1.3 TEMPORARY HEATING

- .1 Furnish equipment, labour and fuel to provide temporary heat as required for proper execution of work.
- .2 Heat enclosed building to minimum 15°C at all times until taken over by Owner. Provide intermittent heating up to 21°C as required for proper execution of work.
- .3 Use propane or natural gas heaters of a type where the flame is not exposed. Open flame heaters are not permitted.
- .4 Uniformly distribute heat to avoid hot and cold areas and to prevent excessive drying.

1.4 TEMPORARY VENTILATION

- .1 Provide minimum 1 air change per hour for enclosed areas receiving architectural finishes.
- .2 Prior to commencement of work where hazardous or volatile adhesives, coatings or substances are used, install adequate mechanical ventilation
- .3 Do not allow excessive build-up of moisture inside building.

1.5 TEMPORARY COMMUNICATIONS

- .1 Provide site telephone service for duration of Contract until completion.
- .2 Provide and maintain equipment on site to send and receive e-mails and other types of communications as well as provide access to the internet for duration of Contract.

1.6 TEMPORARY WATER

- .1 Provide temporary water supply, for use by all Sections.
- .2 Water shall be clean and non-staining.

1.7 TEMPORARY SANITARY FACILITIES

- .1 Provide toilet facilities, including handwash facilities, for all personnel on site.
- .2 Keep facilities clean and sanitary and provided with required supplies at all times.
- .3 Except where temporary sanitary facilities are connected to municipal sewer system, periodically remove wastes from site.

1.8 TEMPORARY FIRST-AID FACILITIES

- .1 Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulations of the Workplace Safety and Insurance Act. Maintain facilities for duration of Contract.

1.9 TEMPORARY FIRE PROTECTION

- .1 Provide and maintain in proper working order at least four fire extinguishers on each floor, prominently placed, until completion of work.
- .2 Fire extinguishers shall be minimum 9 kg 4A 60BC type.
- .3 Remove fire extinguishers from site, upon completion of work or when directed by Consultant.
- .4 Where gas welding or cutting is to be done within 3 m or above combustible material, or above space that may be occupied by persons, interpose shields of noncombustible material. Tanks supplying gases for welding or cutting shall be placed at no greater distance from the work than is necessary and shall be securely fastened in an upright position. Such tanks shall be free from exposure to the sun or high temperature.

1.10 TEMPORARY USE OF PERMANENT SERVICE AND EQUIPMENT

- .1 Do not use any new or existing permanent service or equipment without Owner's written approval.
- .2 Where permission is granted to use permanent services and equipment provide competent persons to operate services and equipment; inspect frequently and maintain facilities in proper operating condition at all times.
- .3 Permanent services and equipment shall be turned over to Owner in "as new" and perfect operating condition.
- .4 Use of permanent systems and equipment as temporary facilities shall not affect the warranty conditions and warranty period for such systems and equipment. Make due allowance to ensure that Owner will receive full benefits of equipment manufacturers warranty after project takeover.

1.11 CONSTRUCTION AIDS

- .1 Provide temporary stairs, ladders, ramps required for movement and placing of materials, equipment and personnel.
- .2 Provide mechanical hoisting equipment and fully qualified operators as required during construction.
- .3 Erect required scaffolding independent of walls, arranged to avoid interference with work of other Sections as much as possible.
- .4 Provide and maintain required shoring and bracing in accordance with Construction Safety Act and other applicable regulations.
- .5 Shoring and all false work over one tier in height shall be designed and shall bear the stamp of a registered professional engineer, having experience in this field.
- .6 The use of explosive power tools will not be permitted under any circumstances unless equipped with a device which positively prevents free flight of the stud.

1.12 BARRIERS

- .1 Protect public and workers from injury.
- .2 Provide and maintain required hoardings, barricades, guardrails, and lights in accordance with applicable regulations.
- .3 Unless otherwise indicated, provide around assigned work, staging and storage areas 1.8 m high fencing, as follows:
 - .1 Steel pipe or tee posts driven into ground minimum 1 m at maximum 3 m o.c.
 - .2 50 mm hot dip galvanized chain link mesh wire tied to posts.
 - .3 Where required, for construction access, hinged, lockable chain link gates.
 - .4 Relocatable wire mesh fencing may be used in lieu of chain link fencing.

1.13 TREE PROTECTION

- .1 Within Contractor's assigned work and storage areas and adjacent to designated access routes, protect existing trees and other plants scheduled to remain. Provide minimum 1.8 m high chain link or wire mesh fencing outside of dripline of trees or groups of trees and other plants.
- .2 Leave fenced areas undisturbed; do not use areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants in areas of tree feeder roots.
- .3 Do not attach rigging cables to trees.

- .4 Where limbs or portions of plants are required to be removed to accommodate new work, they shall be removed in accordance with accepted arboricultural practice.
- .5 Where root systems of protected trees adjacent to construction are exposed or damaged, they shall be neatly trimmed and the area backfilled with suitable material to prevent desiccation.
- .6 Where necessary give plants an overall pruning to restore the balance between roots and top growth and/or to restore appearance.
- .7 Except at locations where specific procedures are included in Contract Documents do not alter grades around existing trees/plants without first obtaining Consultant's consent and directions.

1.14 TEMPORARY CONTROLS

- .1 Provide protective coverings to protect work against damage caused by weather, including but not necessarily limited to rain, snow, ice, wind, frost and excessive heat.
- .2 Provide wind breaks and sun shades to allow proper setting and curing of cementitious materials.
- .3 Protect building materials from freezing. Protect built components from freezing until fully cured.
- .4 Prevent sprayed materials from contaminating air beyond application area, by providing temporary enclosures.
- .5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
- .6 Prevent tracking of mud and dirt from site onto paved roads. Maintain stabilized vehicle egress point (mud mat), constructed of coarse granular material. Place additional granular material as required to maintain access / egress points in proper working order. Clean mud and dirt from paved roads at end of each day by shovelling or sweeping and subsequent washing. Dispose of mud and dirt in a controlled disposal area.

1.15 PEST CONTROL

- .1 Provide rodent control and other pest control programs during construction, in accordance with requirements of jurisdictional authorities.

1.16 TEMPORARY DRAINAGE

- .1 Provide and maintain adequate temporary pumping and drainage systems to keep excavations and structures free of water. Prevent flow of surface water into excavations. Locate sumps away from foundations. Prevent pumped water from carrying soil in suspension in sufficient quantity to cause settlement of adjacent earth. Provide sufficient standby equipment to ensure continuity of pumping systems.
- .2 Control drainage on site to prevent flooding, erosion and run-off onto adjacent properties as a result of construction operations.
- .3 Dispose of water containing silt in suspension in accordance with requirements of jurisdictional authorities.

- .4 Conform to sedimentation and erosion control requirements of the authority having jurisdiction. Maintain until completion of work or until directed by Consultant to be removed, sediment control devices at perimeter of site, catch basins, drainage courses and at other locations on site as directed.

1.17 SIGNS

- .1 Except as specified here do not erect any signs unless approved by the Consultant.
- .2 Erect signs relating to safety on the work, or mandatory regulation notices.
- .3 Prior to commencement of work wherein hazardous or volatile cements, coatings, or substances are used, barricade entire area and post adequate number of "NO SMOKING" signs.

1.18 FIELD OFFICE AND STORAGE SHEDS

- .1 Maintain, until completion of Contract, for Contractor's use, a temporary office as required for work, large enough to accommodate site administrative activities and site meetings, complete with light, heating and cooling equipment to maintain 21°C, ventilation, equipment for sending and receiving electronic messages and providing access to internet, including printer. Provide table and chairs for site meetings. Do not store materials, tools, equipment in meeting area; keep clean and tidy.
- .2 Provide temporary covers, sheds and platforms of weatherproof construction as may be required for protection and preservation of materials, small tools, equipment which may be susceptible to damage.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL INSTRUCTIONS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 REFERENCE STANDARD

- .1 Comply with provisions of OAA, OGCA Document No. 100, revised January 8, 2019 "Take-Over Procedures" except as provided by the Construction Act and as modified in these Specifications.

1.3 OPERATING AND MAINTENANCE MANUALS

- .1 Provide operation and maintenance manuals. Data shall be contained in D-ring binders with soft vinyl covers. Binders shall have clear plastic pocket at back of spine identification containing label "Operation and Maintenance Manual" and project name and volume number, if applicable. Each manual shall contain a title sheet listing project name, date and volume number and names and addresses of Contractors and Subcontractors, Consultant and Subconsultants. Submit two digital copies of the entire manual on a USB, containing the same information arranged in the same order as the hardcopy manuals
- .2 Provide operating and maintenance data in hardcopy, prepared on 8 1/2" X 11" sheets in printed or typewritten form and in digital form.
- .3 Data shall be assembled in systematic order, generally following the specification format. Provide labelled, celluloid covered tabs fastened to hard paper dividers to identify different Sections.
- .4 Provide the following material as applicable to work of this Contract:
 - .1 List of contents. If more than one volume is required, provide a cross-reference contents page at front of each volume.
 - .2 Complete listing of Subcontractors' names, addresses and telephone numbers with notation as to which portions of Contract have been provided by them.
 - .3 Complete list of products used in the work showing product name, part number or code and manufacturer for each listing; follow specification format.
 - .4 Copy of finish hardware list, complete with all amendments and revisions.
 - .5 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose copy of colour schedule.
 - .6 Maintenance instructions for all finished surfaces.
 - .7 Brochures, cuts of all equipment and fixtures.
 - .8 Operating and maintenance instructions for all equipment.

- .9 Valve manual.
- .10 Controls schematics.
- .11 Copies of all warranties, properly executed.
- .12 Maintenance contracts.
- .13 Record drawings of mechanical, electrical and special installations.
- .14 Final reviewed Shop Drawings.
- .15 Other data required elsewhere in Contract Documents or deemed necessary by Consultant

1.4 EXTENDED WARRANTIES

1. Submission Requirements:
 - .1 Submit extended warranties as part of "Operating and Maintenance Manuals".
 - .2 Arrange extended warranties in systematic order matching Specification format. Include a table of contents listing warranties in same order.
 - .3 Each warranty must show:
 - .1 Name and address of Project
 - .2 Name of Owner
 - .3 Section Number and Title
 - .4 All extended warranties must be presented under subcontractor's letterhead, seal and signature and must bear similar wording to that specified in Contract Documents.
 - .5 Submit manufacturers' Product warranties in accordance with GC 12.3.6.

1.5 AS-BUILT DRAWINGS

- .1 Prior to final payment submit as-built drawings specified in Section 01 32 00.
- .2 Clearly and prominently mark each drawing "AS-BUILT DRAWING prepared by _____
_____ (name of Contractor).

1.6 MAINTENANCE MATERIALS

- .1 Deliver to the location directed by Consultant maintenance materials as required elsewhere in these Specifications. Obtain receipt for delivered materials and submit copy of receipt to Consultant.
- .2 Package materials so that they are protected from damage and loss of essential properties
- .3 Label packaged materials for proper identification of contents and project name.

1.7 OPERATING AND MAINTENANCE INSTRUCTIONS

- .1 Prior to requesting Substantial Performance, at a time acceptable to Owner and Consultant, but not before operating and maintenance data has been reviewed and accepted by Consultant, instruct designated Owner's representatives in the operation and maintenance of all systems and equipment.
- .2 Arrange training sessions for each type of operating system and equipment. Sessions shall be conducted by qualified instructors and shall be of sufficient duration and depth to adequately instruct participants.
- .3 Throughout the training sessions make reference to reviewed operation and maintenance manuals to familiarize participants with the data provided.
- .4 Prepare an attendance record for each training session, to be signed by each participant upon conclusion of session. Show date and time of session, subject of session and name, title and organization of each participant. Submit a copy of each record to Consultant.
- .5 Subcontractor whose work is subject of training session and Contractor shall be represented during training session by qualified personnel.

1.8 INSPECTION AND ACCEPTANCE OF WORK

- .1 Prior to requesting Substantial Performance submit the following:
 - .1 One hardcopy of operating and maintenance manual (to be submitted minimum 6 weeks prior to requesting Substantial Performance).
 - .2 Inspection and acceptance certificates required from regulatory agencies.
- .2 Advise the Consultant in writing, when work has been substantially completed. If Consultant agrees that this stage has been reached, prepare a complete list of deficiencies and submit this list to Consultant.
- .3 On receipt of the above deficiency list in a satisfactory form, the Consultant, accompanied by Subconsultants, the Contractor and the Owner, if deemed desirable, will carry out an inspection of the Project.
- .4 Add to the deficiency list, in accordance with Consultant's directions, any additional deficiencies which are identified during inspection and reissue updated deficiency list.
- .5 Upon completion, inspection and acceptance of work, Owner will take over and occupy completed work. Refer to Supplementary Conditions for procedures relating to certification of Substantial Performance and release of holdback. Comply with requirements of the Construction Act regarding liens and statutory holdback. In case of discrepancies between requirements of the Construction Act and requirements included elsewhere in the Contract Documents, the Construction Act shall govern.
- .6 Complete the application for substantial performance form, included following this section, with substantial progress application for payment.

1.9 FINAL SUBMISSION

- .1 Prior to claiming Final Payment do the following:
 - .1 Submit additional hardcopy of operation and maintenance manual and two digital copies on USB Memory Sticks.
 - .2 Submit as-built drawings; including as-built survey (if applicable).
 - .3 Submit one complete set of reviewed shop drawings, folded to 8-1/2" x 11" size, contained in heavy duty manila envelopes, numbered and labelled. Follow specification format with no more than one Section per envelope.
 - .4 Submit maintenance materials.
 - .5 Submit a final accounting of all approved changes to the Contract Price, including adjustments to allowances.

1.10 WARRANTY INSPECTION

- .1 The Contractor shall organize a warranty inspection to take place two weeks prior to the expiration of the standard one-year warranty. The Consultant, subconsultants, the Contractor, subcontractors and the Owner's representatives shall attend.

END OF SECTION

Application for Certificate of Substantial Performance

(To be submitted on Contractor's Letterhead)

Date: _____

To: Lennox Architects Limited

Project: _____

We the undersigned state that the Contract dated _____ between ourselves and the Owner _____ is substantially performed and the performance of the balance of the Contract is in process. The total performance is scheduled for the _____ day of _____ 20____

We further state that the amount of holdback monies due for the release and payment following the issue of the Certificate of Substantial Performance is

_____ and /100 Dollars

(\$ _____)

We further state that the Status of Contract is as follows:

1.	Original Contract Amount	\$ _____
2.	Authorized Changes:	
	Extras	\$ _____
	Credits	\$ _____
	Net Amount of Changes	\$ _____
3.	Current Contract Amount	\$ _____
4.	Less value of incomplete work beyond this Contractor's Control (See attached Appendix for list of items with Costs and dates of completion for each item).	\$ _____
	Total Contract Value for purposes of the Construction Lien Act.	\$ _____
5.	The requirements for substantial performance as per the Construction Lien Act:	
6.	3% of the first \$500,000.00	\$ _____
	2% of the next \$500,000.00	\$ _____
	1% of the balance of item 5 above	\$ _____
	Total	\$ _____

Application for Certificate of Substantial Performance (Cont'd)

- 7. The estimated value of uncompleted work including deficiencies but not including items in 4 above (see attached Appendix for list of items with amounts and dates of completion for each item).

Total \$ _____

- 8. We enclose herewith one copy of List A of the required documentation together with all of the documentation outlined thereon.

We are presently assembling the documentation required by List B which we will submit to the Architect immediately on receipt of the Architect's Certificate of Substantial Performance. We recognize that unless this documentation is submitted prior to the date for release of holdback money, the Architect will recommend to the Owner that the holdback payment be withheld until all documentation is provided.

Please signify your acceptance and correctness of the above and return one copy to our office.

Contractor: _____

Per: _____

Date of Submission: _____

Accepted By:
Lennox Architects Limited

Per: _____

Date of Acceptance: _____

Application for Certificate of Substantial Performance (Cont'd)

List A

1. Operating Instructions
2. Maintenance Manuals
3. Record Drawings
4. Spare Parts
5. Spare Materials
6. Certified Site Plan

List B

1. Statutory Declaration from Contractor
2. Worker's Compensation Board letter of good standing from Contractor
3. Warranty from Contractor
4. Extended warranties as specified
5. Occupancy Certificate
6. Finalized list of all subcontractors and suppliers of material who performed work or supplied material to the project

Less Incomplete work beyond contractor's control

XXXXXXX	\$ _____
XXXXXXX	\$ _____
XXXXXXX	\$ _____
XXXXXXX	\$ _____
XXXXXXX	\$ _____
Remain Allowance	\$ _____
Remain Contingency	\$ _____
Total	\$ _____

List of Balance to complete deficiencies (not including above items)

XXXXXXX	\$ _____
XXXXXXX	\$ _____
XXXXXXX	\$ _____
Total	\$ _____

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Masonry units including, but not limited to, the following:
 - .1 Concrete block masonry;
 - .2 Brick masonry;
 - .3 Reinforced concrete block masonry;
 - .4 Block lintels and other special units;
 - .5 Masonry mortar;
 - .6 Masonry reinforcing;
 - .7 Anchor and tie systems;
 - .8 Reinforcing steel bars and concrete fill to block lintels;
 - .9 Expansion joints and joint flashings;
 - .9 Control joints and preformed joint filler;
 - .10 Concrete fill for reinforced masonry;
 - .11 Installation of loose steel lintels;
 - .12 Supply and installation of anchor bolts for securing wood coping atop masonry.
 - .13 Cleaning Masonry.

1.3 RELATED SECTIONS

- .1 Section 01 35 16- Alteration Procedures;
- .2 Section 05 55 00 – Metal Fabrications;
- .3 Section 07 84 00 – Firestopping and Smoke Seals

- .4 Section 07 92 00 - Sealants, except where specifically stated otherwise herein;
- .5 Section 08 11 13 – Steel Doors and Frames
- .6 Section 08 41 13 – Aluminum Framed Entrances
- .7 Sleeves for mechanical and electrical works penetrating masonry walls or partitions.

1.4 WORK INSTALLED BUT SUPPLIED BY OTHERS

- .1 Build into masonry elements inserts, anchors, bolts, sleeves and other items supplied by other Sections and which are required for installation and performance of work of other Sections.
- .2 Install loose steel lintels required for support of masonry elements.
- .3 Install steel door frames and access doors occurring in masonry elements.
- .4 Install reinforcing steel and concrete fill into block lintels and reinforcing steel grouted into masonry walls as shown on the structural drawings.

1.5 QUALITY ASSURANCE

- .1 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. Membership in good standing in OMCA.
- .2 Meet requirements of CSA A370-14, CSA A371-14 and CSA S304-14.
- .3 Comply with requirements of Section 01 41 00 when constructing fire rated walls and partitions. Solidly fill around beams and joists penetrating fire rated walls/ partitions in accord with requirements of Ontario Building Code.
- .4 Masonry units used in partitions/walls designated to provide a fire separation shall be of thickness and material required to achieve required rating. Hollow masonry units used in fire separation shall have the necessary percentage of solid material to meet required rating. Concrete block used in fire separation shall be suitably identified to permit verification of fire resistance rating.

1.6 SUBMITTALS

- .1 Prior to start of work submit product data and samples of all masonry accessories including but not limited to horizontal reinforcing, ties, weep hole inserts, dampproof coursing, mortar dropping control device.
- .2 Submit drawings showing location of control joints.
- .3 Mock- Up:
 - .1 Construct sample panel of an exposed clay brick infill section with cavity back-up wall including reinforcement, insulation, air barrier, flashings and weep holes. Build sample panel in

stepped-back fashion to expose each material used (brick, insulation, air barrier, block) to a minimum height of 400 mm each. Coordinate with Sections 07 21 00 and 07 27 00 for installation of air barrier and insulation.

- .2 Locate panels where directed by Consultant.
- .3 Do not begin masonry work until panels are approved by Consultant. Approved panel shall represent minimum standard of quality for project masonry

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver and handle masonry units so as to prevent soiling and chipping.
- .2 Store masonry units above and off ground on level platforms which permit air circulation under stacks.
- .3 During storage, protect masonry units against moisture absorption, damage and staining.
- .4 Do not store or locate materials, plant and equipment in areas which will obstruct access to work by others.

1.8 PROTECTION

- .1 When work is not in progress, cover tops of completed masonry elements exposed to weather with non-staining weatherproof covers. Covers shall be at least 600 mm wider than masonry elements and shall be well secured against displacement.
- .2 Protect finished work at corners, sills, projections and other areas likely to be damaged, with suitable coverings until completion of building.
- .3 Adequately brace masonry walls and partitions to resist effects of wind and other lateral forces.

1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Provide uniformly distributed and continuous heating. Prevent stratification and cold spots.
- .2 When outside temperature is below or likely to go below 5 degrees C provide heat to maintain temperature of materials and surrounding air at 5 degrees C or better during laying and for 72 hours thereafter. Submit for approval the proposed method of protecting masonry against low temperatures. Salamanders will not be permitted.
- .3 Keep units completely free from ice and frost. Preheat mortar materials and mortar boards. Temperature of mortar to be between 21 degrees C and 48 degrees C. Protect mortar from frost. Do not use admixtures or antifreezes in mortar.
- .4 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units in winter.
- .5 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

1.4 WARRANTY

- .1 Warrant air/vapour barrier work of this Section for 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; material remaining air and water tight.

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Performance: Design exterior envelope cavity walls based on Rain Screen Principle advocated by NRCC and provide for drainage of water entering envelope cavity wall system. Provide for compartments in long cavity wall and at corners to achieve appropriate pressure equalization in exterior envelope cavity wall design.
- .2 Provide only stainless steel reinforcement for exterior envelope walls.
- .3 Clay Brick:
 - .1 Type: hard burned clay brick to CAN/CSA-A82-14: 92 x 57 x 194 mm: Belden or Glen Gery. Size, colour and finish to match existing red brick. Samples required prior to construction.
 - .2 Provide solid brick where required to avoid exposure of voids. Mitred outside corners are not permitted.
 - .3 Purchase face brick in one lot, sufficient for entire project.
- .4 Concrete Masonry Units:
 - .1 To requirements of CSA A165 Series-14:
 - .1 Standard weight: H/15/A/M and S/15/A/M.
 - .2 Lightweight: H/15/C/M and S/15/C/M .
 - .2 Acceptable manufacturers for block: Permacon, Simcoe Block, Boehmers, Richvale York , Day & Campbell or or other source approved by the Consultant.
 - .3 Units must be cured for at least 28 days before delivery and shall have a moisture content of not more than 30% of total absorption.
 - .4 Exposed concrete block units shall be uniform in size, free of perceptible warp or twist, without chipped, ragged or broken edges; have a uniform surface texture, free of cracks, blemishes or defects detrimental to appearance or performance.
 - .5 Where indicated provide solid and semi-solid (solid top) units.
 - .6 Provide manufacturer's catalogued special units such as bullnose, corner, end, lintel block and others as indicated.
 - .7 Where incorporated into existing block work provide masonry units matching existing block work.

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- .5 Metal Reinforcement:
- .1 Steel wire, cold drawn high tensile strength, to ASTM A82-07, with hot dip galvanized finish after fabrication to ASTM A153, Class B2.
 - .2 Steel wire, cold drawn high tensile strength to ASTM A82-07, with mill galvanized finish to ASTM A116, Class 3.
 - .3 Stainless steel wire: Type 302.
 - .4 Horizontal reinforcement, exterior walls: Truss type with 4.8 mm diameter hot dip galvanized steel side and cross rods; side rods centred on concrete block face shells; prefabricated corner and intersection assemblies: BLOK-TRUS BL30 by Blok-Lok or equivalent product by Dur-O-Wal.
 - .5 Horizontal reinforcement, interior walls. Truss type with 3.6 mm diameter mill galvanized steel side and cross rods; side rods centred on concrete block face shells; prefabricated assemblies at corners and intersections: BLOK-TRUS BL30 by Blok-Lok or equivalent product by Dur-O-Wal.
- .6 Connectors, Ties and Anchors:
- .1 Materials:
 - .1 Steel: hot dip galvanized to ASTM A123-17 and stainless steel Type 302.
 - .2 Wire materials: as specified for metal reinforcement.
 - .2 Cavity wall connectors shall be:
 - .1 At walls less than 13 m high: hot dip galvanized steel.
 - .2 Walls 13 m and higher: stainless steel; where back up wall reinforcement is integral to connectors, it too shall be stainless steel.
 - .3 Cavity wall connectors at walls with concrete block back-up: one of the following types:
 - .1 Fero Holed Shear Connector consisting of 1.6 mm thick steel connector plate of length to suit insulation and concrete block thickness, steel wire V-tie, 4.8 mm diameter and polyethylene insulation support by Form & Build Supply (Toronto) Inc. (905) 629-0242.
 - .2 1.6 mm thick holed steel plate and 4.8 mm diameter steel wire anchor: BL-507S by Blok-Lok.
 - .4 Cavity wall connectors at walls with concrete back-up: one of the following types:
 - .1 Fero Rap Tie consisting of holed connector plate of length to suit insulation thickness, anchored with predrilled concrete anchors, and steel wire V-tie, 4.8 mm diameter and polyethylene insulation support by Form & Build Supply.

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- .2 Predrilled, self-tapping 8 mm diameter helical steel anchors with plastic insulation retainer: Helifix and Wedge-Lok by Blok-Lok, or Helix Spiro-Tie and Vista-Fix by JV Building Products.
 - .5 Cavity wall connectors at walls with structural steel back-up: one of the following types:
 - .1 Fero Rap Tie as specified for concrete back-up.
 - .2 Triangular 4.8 mm steel wire tie and steel anchor: Flex-O-Lok BLT9 and Adjustable Flex-O-Lok Anchor by Blok-Lok.
 - .6 Interior masonry to concrete: 2.5 mm galvanized anchor and 4.8 mm diameter galvanized steel wire tie with galvanized steel dovetail anchor slots: Dovetail Anchors BLT8 by Blok-Lok.
 - .7 Interior masonry to structural steel: 4.8 mm diameter galvanized triangular wire tie with galvanized steel adjustable anchors: Flex-O-Lok BLT9 and Adjustable Flex-O-Lok Anchors by Blok-Lok.
 - .8 Lateral Supports and Ties:
 - .1 Prime coated steel angles 75 mm x 75 mm x 200 mm long x 6 mm thick.
 - .2 Steel: CAN/CSA-G40.21-13 (R2018), Grade 300W.
 - .3 Primer: CAN/CGSB-1.40-M89.
 - .4 Fasteners: Expansion type concrete anchors, two per angle.
 - .5 Reinforcing bar positioners: Dur-O-Wal 1A 810.
 - .7 Dampproof course and membrane flashing: Blueskin TWF by Bakor.
 - .8 Flashing back-up: minimum 0.9 mm thick hot dip galvanized sheet steel; Z275 zinc coating.
 - .9 Mortar dropping control device (cavity drainage mat): high density polyethylene or nylon mesh in trapezoidal configuration designed to facilitate effective drainage of moisture to weep holes; thickness to suit air space: "The Mortar Net" by Mortar Net Solutions.
 - .10 Premoulded Joint Filler: Non-fire rated locations: Type 704 fibreglass board by Owens Corning or Rockboard 40 by Roxul.
 - .11 Concrete block lintels:
 - .1 Reinforcing steel: CSA G30.18-09 (R2014).
 - .2 Cast-in-place concrete: CSA A23.1-14.
 - .12 Control Joint Filler: Emseal 25V Expanding Foam Sealant

- .13 Weep hole inserts: Cell Vent Weep Hole Ventilator by Dur-O-Wal Inc.
- .14 Mortar:
 - .1 Water: potable and non-staining.
 - .2 Sand: CSA A82-56-M1976.
 - .3 Portland cement: CAN3-A5-03, Type 10.
 - .4 Masonry cement: CAN3-A8-03, Type H.
 - .5 Lime: ASTM C207, Type S.
 - .6 Colour pigment: Iron Oxide Pigment Harcros 'F' Series (4 lb - 6% loading) by Elementis (416-251-1161) or type recommended by mortar manufacturer. Colours selected by Consultant.

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Lay masonry work in uniform manner. No one portion of any section of work shall rise more than 750 mm above general level. Do not lay more than 1500 mm in height of any wall in any working day.
- .2 Unless otherwise noted on Drawings, all walls and partitions shall extend to the underside of the structural deck.
- .3 Cut exposed masonry units with power driven table model masonry saw only. Ragged or chipped edges will not be permitted.
- .4 Consult with other Sections to avoid cutting and patching. Co-operate in setting and aligning built-in items. Build in conduit and piping so that they are not exposed. Do not break masonry bond to accommodate concealed built-in items.
- .5 Grout solid with mortar all spaces around built-in items.
- .6 Build in metal nailing plugs, grounds, inserts, anchor bolts, bearing plates, loose and miscellaneous items of steel and iron, isolated beams, lintels and shelf angles, sleeves, blocking and items furnished by other Sections.
- .7 Do not shift or tap masonry units after mortar has taken its initial set.

- .8 At masonry openings less than 450 mm wide, unless otherwise detailed, use mild steel plates, minimum 6 mm thick, of width 25 mm less than supported masonry thickness and with minimum 100 mm end bearing each side.
- .9 Construct structurally reinforced masonry elements in accordance with requirements indicated on structural drawings.
- .10 When infilling new block with existing, masonry to be toothed into the existing block.

3.3 CHASES, SLEEVES, OPENINGS AND HOLES

- .1 Chases, sleeves and openings shall be built in during erection of masonry work, and purpose-made chased units shall be built into proper position
- .2 Openings in masonry work exceeding 450 mm shall be provided with lintels in accord with lintel schedule.
- .3 Chasing of completed walls or formation of holes shall only be carried out with Consultant's prior approval, and then only with a tool designed to cleanly cut masonry units.
- .4 Chases shall be plumb and shall be minimum of one unit length from jambs of openings.
- .5 Horizontal or diagonal chases are not permitted

3.4 MASONRY BEARING

- .1 Masonry bearing shall extend full thickness of wall.
- .2 Unless otherwise indicated, provide at least 200 mm of bearing for lintels and beams.
- .3 Bearings of block masonry walls: use minimum 2 courses of solid or grouted block units except where concrete bearing pads are required.
- .4 Bearings in brick masonry walls: use solid face brick where exposed to view..
- .5 Build masonry neatly around beam, and lintel bearings.

3.5 CONSTRUCTION JOINTS

- .1 Where fresh masonry joins partially or totally set masonry, clean exposed surfaces of set masonry and remove loose mortar and foreign material prior to laying fresh masonry.
- .2 If necessary to stop off a horizontal run of masonry, rack back one-half masonry unit length in each course. Tothing will not be permitted unless approved by the Consultant.

3.6 BLOCKWORK

- .1 Blockwork shall be laid up in running bond except where shown otherwise. Unless otherwise indicated, blocks shall be of thickness required to produce total wythe thickness
- .2 Do not wet blocks before laying.
- .3 Units shall be laid with webs aligning one over the other in full bed of mortar over entire laying surface including webs.

- .4 Exposed faces shall be full units laid out to minimize cutting with not less than 100 mm any at vertical edge or corner.
- .5 Top course of block walls shall be laid with semi-solid blocks at door and window sills, at wall changes to brick and where shown. Top course of freestanding block walls shall be bullnosed all sides.
- .6 Partitions which do not extend full height, to underside of structural deck, shall be capped with solid or semi-solid (solid top).
- .7 Provide solid block roof parapets or fill hollow block with grout.
- .8 Use solid block for at least two courses under all point bearing loads.
- .9 Form exposed external block foundation corners with end units.
- .10 Provide bullnose block at all exposed vertical and horizontal block corners. Where directed by Consultant provide square corner block at first course above floor; grind corner above base to match bullnose above. At head of exterior doors grind bottom inside corner of lintel block to provide bullnose.
- .11 Provide minimum 400 mm solid or grouted block for jambs of openings and at ends of walls.
- .12 Cut with power saw exposed units to accommodate flush mounted electrical outlets, grilles and other components. Leave maximum 5 mm clearance. Cover plates and flanges must cover cut edges.
- .13 Blockwork scheduled to be left exposed or painted shall be laid and pointed with utmost care. Distribute units of varying colour and texture evenly to achieve homogeneous blend. Replace at no extra cost to Contract, block units which in the opinion of the Consultant are too contrasting in appearance for satisfactory blending.
- .14 Take special care to prevent mortar or other substances from staining exposed block faces. Replace stained blocks as directed by the Consultant at no extra cost to Contract.
- .15 Where new block is adjacent to existing block walls, new block to be keyed into existing and joints to align.

3.7 BLOCK LINTELS

- .1 Build block lintels; install reinforcement and concrete fill. Unless otherwise detailed make lintels 200mm high.
- .2 Lintels shall have minimum 200 mm bearing, with care taken in layout of wall to ensure that lintel jointing coincides with regular bond of wall.
- .3 Provide building paper in joint at bearings and at vehicle joint at ends of block lintels to break bond.

3.8 BRICKWORK

- .1 Lay clay brick in running bond except where shown otherwise. Provide header, soldier, rowlock and special band courses, where indicated. Provide solid units at outside corners; mitred units will not be accepted.

- .2 Lay exposed face brick in full horizontal modules only, except where Consultant has approved use of cut units. Make small adjustments in width of vertical mortar joints to maximize use of full modules. Cut units, where permitted by Consultant, shall be located as directed by Consultant.
- .3 Completed brickwork shall appear uniform and well blended, free of contrasting areas. Replace at no cost to Contract, brickwork which does not meet this requirement.
- .4 Brick with an absorption rate of over 1 g/min./1000 mm² when tested in accordance with ASTM C67 shall be dampened before laying.
- .5 Tops of walls which have been left exposed for any period of time shall be dampened before work is commenced again, if required.
- .6 Brickwork at different levels shall be stepped in regular proportions between levels.
- .7 Brickwork shall be laid up with the shove joint method in full bed of mortar with vertical and horizontal joints filled flush. Slushing mortar into joints after brick is laid, is not permitted.
- .8 All joints in brickwork, including bed and collar joints, shall be filled flush as each course is laid. Pull down and rebuild walls/partitions which do not meet this requirement as directed by Consultant and at no extra cost to Contract.
- .9 Variations in size of brick shall be evenly distributed in wall so that mortar joints are uniform throughout.
- .10 At first brick course over steel lintels place brick directly on membrane flashing without mortar.
- .11 At external corners other than 90° provide special custom shape solid corner units.

3.9 CAVITY WALLS

- .1 Erect interior wythe masonry and co-ordinate with Sections 07 21 00 and 07 27 00 for installation of air barrier and insulation.
- .2 Ensure that air barrier and insulation are complete and have been inspected and accepted by Consultant prior to installation of exterior wythe masonry.
- .3 After the first course of exterior masonry units is laid install one continuous row of mortar dropping control device at bottom of cavities and veneer air space; place device on top of membrane flashing, with "zig-zag" side up. Where cavity/air space is larger than 25 mm use multi-layer mortar dropping control device of thickness designed to fill space completely.
- .4 Keep the cavity clean and free from mortar droppings or projections. Bevel the "cavity" edge of the mortar bed immediately after "stringing" the mortar.
- .5 Reinforce back up masonry with continuous metal reinforcement at maximum 400 mm o.c. vertically. Provide additional reinforcing at openings as specified hereinafter. Provide first row of reinforcing at first joint above support. Place reinforcement in alternate courses to cavity wall connectors, except where connectors are integral with reinforcement.

- .6 Provide cavity wall connectors at maximum 400 mm o.c. horizontally and vertically, unless other spacing, supported by manufacturer's engineering analysis is accepted by jurisdictional authorities. Locate first row of connectors/ties at 200 mm above foundations and loose lintels and at maximum 400 mm above shelf angles; install connectors/ties above through wall metal flashings. Locate last row of connectors/ties maximum 200 mm below openings and below top of parapets. Locate connectors/ties maximum 300 mm from inside and outside corners and at maximum 200 mm each side of expansion and control joints.

3.10 JOINT WORK

- .1 Make joints uniform and 10 mm thick unless otherwise shown on Drawings.
- .2 Joints in exposed and painted surfaces, and in masonry behind wall mounted and built-in fixtures, shall be tooled when thumbprint hard with a 25 mm o.d. plastic tool to produce a concave joint..
- .3 Joints in unparged masonry below grade shall be pointed tight with a trowel.
- .4 Joints directly behind resilient base, rigid insulation, ceramic tile and gypsum board shall be struck flush.

3.11 ANCHORING, BONDING AND REINFORCING

- .1 Anchor or bond walls and partitions at points where they intersect.
- .2 Except where stack bond is required bond each wythe or masonry walls and partitions at corners by alternately bonding 50% of units of each wall and partition at corner intersection.
- .3 Bond non-loadbearing walls and partitions to loadbearing walls with ties spaced at 400 mm o.c. vertically. Provide one tie for each 100 mm thickness, or part thereof, of wall or partition.
- .4 Anchor masonry walls and partitions to concrete and steel elements with anchors spaced at 400 mm vertically.
- .5 Unless otherwise indicated reinforce all walls and partitions with continuous horizontal metal reinforcement, installed at 400 mm o.c. vertically.
- .6 At wall openings place continuous reinforcement in first and second mortar joints above and below openings. Additional reinforcement at openings shall extend 610 mm beyond both sides of openings.
- .7 Install prefabricated corner assemblies at corners.
- .8 Lap continuous reinforcement 150 mm at splices. Cut reinforcement at control joints.
- .9 Provide lateral support angles at top of non-loadbearing masonry/walls partitions. Anchor angles to structural deck or beam at 10x partition/wall thickness (maximum 2 m o.c.) staggered each side of

3.12 CONTROL JOINTS

- .1 Provide control joints at masonry walls supported by foundation walls at approximately 7.5 m o.c. and at masonry walls supported on framed slabs at approximately 4 m o.c., and where shown on Drawings. Confirm actual locations of control joints with Consultant before starting work.
- .2 Provide control joints at intersection of bearing and nonbearing walls.

- .3 At cavity walls, offset control joints at outer and inner wythe as shown.
- .4 Construct control joints as shown on Drawings. Unless otherwise shown make control joints 10 mm wide. Interrupt masonry reinforcement at control joints. Provide expanding foam sealant at control joint, at exterior and interior wythe.
- .5 Control joints must be constructed during erection of masonry, and may not be sawcut later.

3.13 MEMBRANE FLASHINGS / DAMPPROOF COURSE

- .1 Install dampproof course on top of foundation walls above grade.
- .2 Install membrane flashing at bottom of cavity walls; where shown, and at the following locations:
 - .1 Door heads
 - .2 Window heads
 - .3 Immediately above horizontal interruptions within exterior walls.
 - .4 Below precast concrete components.
- .3 Lap membrane flashing 100 mm at joints; seal lap with adhesive.
- .4 In all cases extend membrane flashing 13 mm beyond outside face of wall or outside edge of steel lintel. Trim as required to Consultant's later instructions.
- .5 Unless otherwise indicated carry membrane flashing up behind exterior wythe masonry units min. 200 mm and turn into concrete block back-up. Mechanically secure top edge at concrete back-up.
- .6 Membrane flashings require continuous support at all locations. Provide sheet metal back-up where shown and where required. Metal backing shall not protrude beyond exterior face of exterior wall.

3.14 WEEP & VENT HOLES

- .1 Form weep holes by inserting weep/vent hole inserts into exterior wythe mortar joint immediately above all membrane flashings, and at other locations where shown. Space weep holes at 800 mm o.c. horizontally.
- .2 Form vent holes by inserting weep/vent hole insert into exterior wythe mortar joint near top of each cavity compartment and at other locations, where indicated. Space vent holes at 800 mm o.c. horizontally.
- .3 Keep face of weep/vent hole inserts back from face of brick minimum 6 mm. Keep weep holes free of mortar.

3.15 STEEL DOORS AND FRAMES

- .1 Install steel frames in masonry walls. Build in frames rigid, true and plumb. Fill voids between frames and masonry with grout. Fill fixed centre mullions at double doors with grout.

- .2 Brace frames solidly in position while being built in. Provide temporary horizontal wood spreader at mid-height of frames to ensure maintenance of required frame width until masonry work is completed. For frames over 1200 mm width provide temporary vertical support at centre of head.
- .3 Construct structurally reinforced masonry elements in accordance with requirements indicated on structural drawings.
- .4 Comply with installation requirements specified under Section 08 11 13.
- .5 Provide galvanized metal drip flashing above door frames.

3.16 GROUTED MASONRY

- .1 Provide grouted masonry at loadbearing walls in accordance with requirements shown on structural drawings.

3.17 MISCELLANEOUS

- .1 Where non-loadbearing, non-fire rated partitions extend to underside of structure, terminate partitions as detailed. Where not detailed allow for structural deflection and fill space with premoulded joint filler. Refer to Section 07250 for firestopping requirements at fire rated partitions.
- .2 Provide continuous 0.1 mm thick polyethylene or glass fibre reinforced kraft paper - asphalt laminate bond breaker at base of partitions and walls which bear on concrete slabs.
- .3 Provide paper backed galvanized steel lath as required for support of grout and mortar fill within masonry elements.
- .4 Install access doors occurring in masonry elements, required by Divisions 21 to 28. Install access doors plumb, level, properly aligned and securely anchored, in locations directed by Divisions 21 to 28. Remove all excess grout and masonry debris from shafts and chases accessible by means of access doors.

3.18 PARGING

- .1 Provide parging at locations shown.
- .2 Parging mix: 1 part Portland cement and 3 parts sand by volume, mixed with sufficient water to produce workable mix.
- .3 Bond coat mix: 24 kg Portland cement and 4L parging bonding agent and 4L water.
- .4 Prepare substrate and apply bond coat in accordance with bonding agent manufacturer's recommendations. Apply parging while bond coat is still moist and tacky. Apply parging minimum 6 mm thick, trowelled to smooth surface.

3.19 MORTAR

- .1 Mix mortar in accordance with table 2 of CSA A179-04 except as specified herein.
- .2 Place an experienced and competent person in direct charge of proportioning and mixing operations.

- .3 Except where specified otherwise do not add admixtures of any kind to mixes.
- .4 All mortar shall be mixed for a period of not less than 3 minutes and not more than 10 minutes.
- .5 Provide all mortar by one of the following: Max-Mix, Jiffy, Forwells or King Products.
- .6 Mix coloured mortar in colour selected by Consultant, in accordance with pigment manufacturer's recommendations. Make adjustments in colour mix as directed by Consultant.
- .7 Time Limits and Retempering: Use and place mortar in final position within following time limits after mixing:
 - .1 Air Temp. above 26.5oC - 2 hours.
 - .2 Air Temp. below 26.5oC - 2.5 hours.
- .8 Mortar Schedule:
 - .1 Exterior wythe of exterior walls: 1:1:6 cement lime mortar.
 - .2 At foundations walls and solid bearing courses: type M mortar.
 - .3 Bearing walls and interior wythe of exterior walls: type S mortar.
 - .4 Non-bearing interior partitions: type N mortar.
 - .5 Provide coloured mortar where indicated.

3.20 SITE QUALITY CONTROL

- .1 Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.
- .2 Replace masonry units stained or chipped, or materials affected by inadequate protection.

3.21 REPAIR

- .1 Repoint defective joints as follows: Cut back joints 13 mm taking care not to damage units. Remove dust and loose materials by brushing or by water jet. If water jet is used, allow excess water to drain before repointing
- .2 Repoint with same mix and colour as original.
- .3 Pack mortar tightly in thin layers and tool joint to match non-defective joints.

3.22 CLEANING

- .1 Obtain cleaning materials in accordance with manufacturer's instructions and brick manufacturer's written instructions for cleaning and verify cleaning procedures outlined in CSA A371 with manufacturers. Follow brick manufacturer's written instructions for cleaning masonry. Test sample area, 10 m² (100 sq ft), to judge effectiveness of cleaning procedures and obtain Consultant's approval.
- .2 Keep wall clean and free of mortar stains during laying. Allow mortar droppings which adhere to wall to dry out but not set. Then rub with small piece of masonry followed by brushing to remove all traces.

On completion of masonry construction, after mortar is thoroughly set and cured, clean masonry thoroughly.

- .3 Protect windows, trim and metal from cleaning agents.
- .4 Remove mortar with wood paddles and scrapers before wetting. Saturate masonry with clean water and flush off loose mortar and dirt. Clean blockwork using water, scrubbing brushes and wood paddles only.
- .5 Clean masonry to be left exposed, using procedures as outlined herein and, where this is inadequate, try following recommendations outlined in BIA's Technical Note No. 20, June 2006.
- .6 Particular care should be taken when cleaning lighter coloured clay bricks even with non-acid based cleaning solutions. Dark red or brown residue resulting from cleaning operations when allowed to run down face of brick could streak and discolour exterior facing. Protect lighter coloured Products by masking them from run off or by taking measures recommended by brick manufacturers.
- .7 Clean calcium silicate masonry units only with non acid based cleaning solutions.
- .8 Should these methods prove inadequate consult masonry manufacturer before undertaking unusual cleaning procedures and obtain Consultant's prior consent.
- .9 Clean adjacent surfaces completely, which have been soiled or otherwise marred.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide metal fabrications including but not limited to following:
 - .1 Miscellaneous metals and lintels;

1.3 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures
- .2 Section 06 10 00 – Rough Carpentry
- .3 Section 09 91 00 – Painting

1.4 WORK SUPPLIED BUT NOT INSTALLED

- .1 Supply following items for installation under other Sections of work: anchor bolts, bearing plates, sleeves and other inserts to be built into concrete and masonry elements and required for anchorage and support of metal fabrications.
- .2 Supply other Sections with instructions, and if required, templates, necessary for accurate setting of inserts and components.

1.5 SUBMITTALS

- .1 Shop Drawings:
 - .1 Visit site to confirm appropriate dimensions and site conditions prior to submission of shop drawings.
 - .2 Submit digital shop drawings to Consultant for review.
 - .3 Shop drawings to indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, accessories and other pertinent data.
 - .4 Shop drawings shall bear the seal and signature of the structural engineer, licensed in the Province of Ontario, responsible for the design.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle and store fabricated components to prevent permanent distortion, corrosion and damage.
- .2 Handle and store metal materials at the job site in such a manner to prevent damage to other materials, to existing building or property.

1.7 QUALITY ASSURANCE

- .1 Provide welding in accordance with CSA W59 performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau.
- .2 Upon completion of installation of ladders, stairs, platforms, pit covers, balustrades, bench brackets and railings submit certification by professional engineer responsible for design of these components, verifying that they have been installed in accordance with reviewed shop drawings.
- .3 Sizes of structural members, shall be taken to be a minimum size and shall not be decreased without Consultants' approval.

PART 2 – PRODUCTS**2.1 MATERIALS**

- .1 Steel sections and plate: CSA-G40.20 and CSA-G40.21, Grade 300W.
- .2 Square steel tube: CSA-G40.20 and CSA-G40.21, Grade 350W, Class H.
- .3 Steel pipe: ASTM A53, Type E, Grade A.
- .4 Sheet steel: hot dip galvanized, cold rolled, with stretcher level degree of flatness to ASTM A553; zinc coating designation Z275.
- .5 Aluminium:
 - .1 Extrusions: ASTM B221-14 6063-T5 or T6.
 - .2 Sheet, plate: ASTM B209-14, 1100 or 3000 Series alloy, anodizing quality.
- .6 Stainless Steel: ASTM A167, Type 304 alloy with exposed surfaces having No. 4 polished finish. Sizes as required to meet design requirements.
- .7 Structural Aluminum: to CSA HA series - M, Type 6061-T6, clear anodized.
- .8 Welded steel wire mesh: 5/5 50 x 50 mm at stair railings and guards and 3/3 75 x 75 mm elsewhere conforming to ASTM A510M by Gerard Daniel Worldwide, Canadian Division.
- .9 Welding materials:
 - .1 Steel: CSA W59-18

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- .2 Aluminum: CSA W59.2-18
 - .10 Bituminous enamel: alkali resistant asphaltic coating.
 - .11 Supply bolts, nuts and washers conforming to ASTM A325M. Supply each type and size of bolt and nut of same manufacture and of same lot.
 - .12 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.
 - .13 Nuts: Heavy hexagon semi-finished nuts.
 - .14 Washers: Flat and smooth hardened washers, quenched and tempered to suit applications and conforms to ASTM F844. Provide AISI Type 304 stainless steel washers at exterior locations.
 - .15 Hardened Steel Washers: To suit applications and conforms to ASTM F436M.
 - .16 Stainless Steel Bolts: To suit applications and conforms to ASTM F738M.
 - .17 Stainless Steel Nuts: To suit applications and conforms to ASTM F836M.
 - .18 Lock Washers: Helical spring type steel "lock" washers to suit applications and conforms to Federal specification FF-W-84. Provide AISI Type 304 stainless steel lock washers at exterior locations.
 - .19 Exterior Vandal Resistant Fasteners: AISI Type 304 stainless steel, dual pin type vandal resistant fasteners to suit applications and acceptable to Consultant.
 - .20 Security Fasteners: Button head "Torx® Plus R" screw tamper resistant #10, 25 mm long 2 per glass stop minimum stainless steel machine screws.
 - .21 Common or Ordinary Bolts and Anchor Bolts: Unfinished bolts conforming to ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. Supply common bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers. Supply anchor bolts of lengths noted, but projecting not less than 13 mm beyond nut unless otherwise noted.
 - .22 Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type to acceptance of Consultant.
 - .23 Galvanized Primer Paint: Zinc rich conforming to CAN/CGSB-1.181 for new galvanized metal.
 - .24 High Performance Corrosion Protection for Perimeter Steel: 1 component, moisture cured, micaceous iron oxide/zinc filled primer, UL Classified in accordance with ANSI/UL 263 (ASTM E119), corrosion protection in accordance with ASTM B117, meeting Class B Slip Certification in accordance with American Institute of Steel Construction (AISC) requirements for slip critical bolted connections, tested in accordance with ASTM E736 for its suitability for application of primer over steel to receive sprayed fireproofing, "Series 394, PerimePrime" by Tnemec Company Incorporated; www.tnemec.com.
 - .25 Steel Pipe Handrails: Conforming to ASTM A53/A53M, Type "S", Schedule 40, Grade A steel pipe of sizes shown.
 - .26 Steel Pipe Bumpers: Conforming to ASTM A53/A53M, Schedule 80 steel pipe of sizes shown.
 - .27 Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m².

- .28 Galvanized Sheet Steel: Supply 0.91 mm (20 ga) core thickness commercial quality to ASTM A653/A653M, CS Type A, with Z275 (G90) zinc coating designation to ASTM A653/A653M.
- .29 Expanded Steel Mesh: Flattened, expanded, carbon steel mesh of 10 msg gauge thickness, weighing minimum 51 kg/10 m² style 33 mm SWD x 81 mm LWD, 292 mm - No.9 by Gerard Daniel Worldwide, Canadian Division, Expanded Metal Corporation or Dramex International.
- .30 Welded Steel Wire Mesh: 50 mm x 50 mm x 3.4 mm diameter, welded carbon steel wire mesh conforming to ASTM A510M by Gerard Daniel Worldwide, Canadian Division.
- .31 Handrail Wall Brackets: In accordance with OBC requirements and to meet design requirements indicated on Drawings.

2.2 FABRICATION

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

2.3 FINISHES

- .1 Thoroughly clean steel of loose scale, rust, oil, dirt and other foreign matter. Suitably prepare steel surfaces by power tool cleaning to receive specified finishes.
- .2 Grind smooth sharp projections.
- .3 Remove oil and grease by solvent cleaning.
- .4 Hot dip galvanize steel components after fabrication in accordance with requirements of CAN/CSA-G164-18, minimum coating weight 600 g/m².
- .5 Clear anodized aluminum components AA M12 C22 A41.

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

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install components plumb, square, straight and true to line. Drill, cut and fit as necessary to attach this work to adjoining work.
- .2 Provide temporary supports and bracing required to position components until they are permanently anchored in place.
- .3 Securely anchor components in place; unless otherwise indicated, anchor components as follows:
 - .1 To concrete and solid masonry with expansion type anchor bolts.
 - .2 To hollow construction with toggle bolts.
 - .3 To thin metal with screws or bolts.
 - .4 To thick metal with bolts or by welding.
 - .5 To wood with bolts or lag screws.
 - .6 Fill space between railing members and sleeves with non-shrink grout.
- .4 Provide all components required for anchoring. Make anchoring in concealed manner wherever possible. Make exposed fastenings, where approved by Consultant, neatly and of same material, colour, texture and finish as base metal on which they occur. Keep exposed fastenings evenly spaced.
- .5 Dissimilar metals and metals in contact with cementitious elements shall have contact surfaces coated with bituminous paint or be isolated by other means as approved by Consultant.
- .6 After installation, clean and refinish injured finishes, welds, bolt heads and nuts. Refinish with zinc rich paint or primer to match original finish.
- .7 Remove protective coverings from stainless steel components prior to Substantial Performance or when directed by Consultant.

3.3 SITE QUALITY CONTROL

- .1 Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation.

- .2 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

- .1 On completion of installation, carefully clean metal work.

3.5 SCHEDULE

- .1 Provide all metal fabrications required whether listed hereunder or not, unless clearly covered by another Section. Unless otherwise shown provide hot dip galvanized steel components.
- .2 List of Components:
 - .1 Sill support brackets
 - .2 Loose lintels, plates, angles and other members required but not shown on drawings.
 - .3 Other metal fabrications required.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide Rough Carpentry work including but not limited to following:
 - .1 Miscellaneous interior carpentry;
 - .2 Built up / blocking as required.

1.3 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 06 61 16 – Solid Surfacing.

1.4 REFERENCES

- .1 Exposed Framing: Framing not concealed by other construction.
- .2 CSA O80 Series-08 - Wood Preservation
- .3 CSA O121-08 - Douglas Fir Plywood
- .4 CAN/ULC-S102-07 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.5 QUALITY ASSURANCE

- .1 Lumber shall bear the grading stamp of an agency certified by The Canadian Lumber Standards Administration Board.
- .2 All lumber shall be sound, straight, dressed all sides and kiln dried, and moisture content at any time during shipment and storage shall not exceed 19%.
- .3 Provide roof sheathing bearing the COFI grading stamp for identification.
- .4 Provide "treated" and "fire treated" wood and plywood bearing the stamp of the Canadian Wood Preservers Bureau.

1.6 WORK SUPPLIED BUT NOT INSTALLED

- .1 Supply to other Sections anchors, bolts, rough hardware and other items required to be built into work of other Sections to receive, accommodate, secure work of this Section.
- .2 Provide other Sections with instructions to ensure accurate setting of built-in items.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Store lumber in a dry place and protect from dampness and damage.
- .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 LUMBER**

- .1 Meet requirements of CSA-086-94 Strength Group D (spruce-pine-fir) and CAN/CSA-0141-05 and National Lumber Grading Authority (NLGA) Standard Grading Rules.
- .2 Light Framing: Species Group D, Standard Grade.
- .3 Studding: Species Group D, Stud Grade.
- .4 Structural Light Framing: Species Group D, No. 1 Grade.
- .5 Appearance Lumber: Species Group B, Appearance Grade.
- .6 Hardwood Lumber: Of grades conforming to grading rules of U.S. National Hardwood Lumber Association, solid Yellow Birch, select or better.
- .7 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.
- .8 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.
- .9 Blocking, Copings, Nailers, Curbs: NLGA 122c "Standard".

2.2 PLYWOOD

- .1 All locations except backboards: Canadian Softwood Plywood to CSA 0151-04 Unsanded Sheathing Grade.
- .2 Backboards: Canadian Softwood Plywood to CSA 0151-04, Sanded grade, solid two sides, fire retardant pressure treated.
- .3 Plywood, select grade, unsanded conforming to CSA O121.

2.3 WOOD TREATMENT

- .1 Preservative pressure treated components: to CSA-080 Series-97, arsenic free, using copper and azole.
- .2 Surface cut, bore and trim components to sizes required as much as possible prior to pressure treatment.

2.4 FIRE TREATED WOOD AND PLYWOOD

- .1 Flame Spread: Max 25 in 30 minutes in accordance with CAN/ULC-S102.
- .2 Provide fire treated wood kiln dried to max 19% moisture content.
- .3 Provide fire treated material bearing the stamp of the Canadian Wood Preservers Bureau and the ULC stamp.
- .4 Pressure treated lumber and plywood with fire retardant chemicals to meet an UL FR-5 rating with a surface-burning characteristics rating of 25 or less for flamespread, fuel contributed and smoke developed. Ensure each piece of fire retardant treated lumber and plywood bears a ULC label or imprint attesting to this rating.
- .5 Fire Resistant Barrier: Non-toxic, water based latex fire resistant coating with proprietary fibers, 68% solids, each container or package bearing ULC label, "Firefree Ff88" by International Fire Resistant Systems, Inc.; www.phoenixthermal.com

2.5 FASTENERS AND CONNECTING HARDWARE:

- .1 Nails: to CSA B111-1974, except where otherwise shown hot dip galvanized steel for exterior work including components located in exterior walls and roofs; bright finish steel in all other locations. Unless otherwise indicated use common spiral flathead nails. Provide stainless steel fasteners for preservative pressure treated wood.
- .2 Bolts, nuts, washers: ASTM A307, hot dip galvanized steel.
- .3 Connectors, anchors, brackets, spikes: hot dip galvanized structural quality steel.
- .4 Screws: zinc, cadmium or chrome plated..
- .5 Fasteners in contact with preservative pressure treated wood shall be stainless steel.

2.6 WOOD TREATMENT

- .1 Preservative pressure treated components: to CSA-080 Series-97, arsenic free, using copper and azole.
- .2 Fire retardant pressure treated components: to CSA-080 Series-97 for maximum flame spread of 25 and labelled by ULC.
- .3 Surface cut, bore and trim components to sizes required as much as possible prior to pressure treatment.

PART 3 – EXECUTION**3.1 EXAMINATION**

- .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.
- .2 Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- .1 General:
 - .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.
 - .2 Where other materials and components are to be applied directly over wood members recess heads of fastening devices below wood surfaces.
 - .3 Where work remains exposed to view, fasteners shall be uniformly and evenly spaced and neatly installed.
 - .4 Locate joints over bearing or supporting surfaces
 - .5 Provide running members full length wherever possible.
 - .6 Design for expansion and contraction of the materials.
- .2 Nailers, Clocking, Copings, Grounds, Curbs
 - .1 Provide wood nailers, blocking, copings, strapping, bucks, grounds and other rough carpentry components to sizes and in locations required for satisfactory support of fabricated items and other work. Provide wood blocking at steel stud framed gypsum board partitions for support of wall mounted components.
 - .2 Unless otherwise indicated, provide minimum 38 mm thick materials. Grounds may be 21 mm thick material unless otherwise indicated.
 - .3 Provide built-up wood curbs for rooftop mounted equipment. Unless otherwise detailed, provide 90 mm thick curbs extending minimum 300 mm from top of roof membrane to top of curb.
- .3 Anchors and Fasteners
 - .1 Provide rough hardware including nails, screws, bolts, washers, brackets, hangers, and fastening devices of all types.
 - .2 Unless otherwise indicated, attach wood members at maximum 600 mm o.c. as follows:
 - .1 To concrete and solid masonry with expansion or friction type anchor bolts.
 - .2 To hollow masonry with toggle bolts
 - .3 To heavy gauge metal with bolts.
 - .4 To light gauge metal with screws or bolts.

- .5 To wood with nails, screws or bolts as required to ensure stability.
- .3 Fasten wood copings to supporting masonry elements with 13 mm galvanized steel bolts minimum 300 mm long spaced maximum 600 mm o.c. Where width of coping plate exceeds 100 mm, stagger bolts off centre.
- .4 Pressure Treated and Fire Rated Components
 - .1 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).
 - .2 Provide "fire treated" plywood.
 - .3 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.
- .5 Backboards
 - .1 Where required by Division 26 00 00 and by telephone system supplier, provide minimum 19 mm thick fire retardant treated plywood backboards mounted on strapping if required.
 - .2 Size backboards to adequately accommodate equipment to be mounted. Secure boards with countersunk fasteners to supporting walls in manner which will carry equipment load without damaging wall.

3.3 SITE QUALITY CONTROL

- .1 Replace damaged work which cannot be satisfactorily repaired to satisfaction to Consultant at no cost to Owner.

3.4 PROTECTION

- .1 Protect rough carpentry from weather.

END OF SECTION

PART 1 – GENERAL**1.1 SUMMARY**

- .1 Section Includes: Provide building insulation including but not limited to following:
 - .1 Board, batt and loose insulation throughout building, except as specified under other Sections. This Section establishes insulation and accessory Products and minimum performance criteria which apply to board, batt and loose insulation types used throughout this Project. Read and become familiar with insulation requirements of all Sections;
 - .2 Air sealing to supplement and provide continuity of main and primary air/vapour barrier assembly including sealing and/or filling of perimeter of door and window openings, crevices, gaps, cracks in walls, roof/wall connections, mechanical and electrical penetrations in walls, floors, roofs, curtain wall mullions, beams, columns enclosures and other similar locations with polyurethane foam consisting of a single mix of chemical in pressurized container formulated to cure when exposed to moisture present in air to provide and maintain air/vapour barrier integrity and impermeable barrier to air infiltration or loss.

1.2 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 04 20 00 – Masonry Units;
- .3 Section 07 27 00 – Air Barrier;
- .4 Section 07 92 00 - Sealants, except where specifically stated otherwise herein.
- .5 Insulation for mechanical work.

1.3 REFERENCE STANDARDS

- .1 Rain Screen Principle: A theory governing the design of a building enclosure in such a way as to prevent water penetration due to rain; in other words, a scientific approach to eliminating water leakage.
- .2 ASTM C165-07(12) - Standard Test Method for Measuring Compressive Properties of Thermal Insulations
- .3 ASTM C553-11 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
- .4 ASTM C578-12a - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
- .5 ASTM C612-10 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation

.6	ASTM C692-08e1	- Standard Test Method for Evaluating the Influence of Thermal Insulations on External Stress Corrosion Cracking Tendency of Austenitic Stainless Steel
.7	ASTM C795-08	- Standard Specification for Thermal Insulation for Use in contact with Austenitic Stainless Steel
.8	ASTM C871-11e1	- Standard Test Methods for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate, and Sodium Ions
.9	ASTM C1303/C1303M-12	- Standard Test Method for Predicting Long-Term Thermal Resistance of Closed Cell Foam Insulation
.10	ASTM C1338-08	- Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
.11	ASTM D1621-10	- Standard Test Method for Compressive Properties of Rigid Cellular Plastics
.12	ASTM D2842-12	- Standard Test Method for Water Absorption of Rigid Cellular Plastics
.13	ASTM E84-12b	- Standard Test Method for Surface Burning Characteristics of Building Materials
.14	ASTM E96/E96M-10	- Standard Test Methods for Water Vapor Transmission of Materials
.15	ASTM E136-12	- Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
.16	ASTM E283-04(12)	- Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
.17	CAN/CGSB-51.34-M86	- Vapor Barrier, Polyethylene Sheet for Use in Building Construction
.18	CGSB 71-GP-24M	- Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation
.19	CSA A440-00(05)	- Windows
.20	CAN/ULC-S102-07	- Test Method of Surface Burning Characteristics of Building Materials and Assemblies
.21	CAN/ULC-S114-05	- Standard Method of Test for Determination of Non Combustibility in Building Materials
.22	CAN/ULC-S701-11	- Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering
.23	CAN/ULC-S702-09	- Standard for Mineral Fibre Thermal Insulation for Buildings

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| .24 | CAN/ULC-S705.1-01 | - Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification |
| .25 | CAN/ULC-S710.1-11 | - Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 1: Material Specification |
| .26 | CAN/ULC-S710.2-11 | - Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 2: Application |
| .27 | CAN/ULC-S711.1-11 | - Standard for Thermal Insulation - Bead Applied Two-Component Polyurethane Air Sealant Foam, Part 1: Material Specification |
| .28 | CAN/ULC-S711.2-11 | - Standard for Thermal Insulation - Bead Applied Two-Component Polyurethane Air Sealant Foam, Part 2: Application |
| .29 | CAN/ULC-S770-09 | - Standard Test Method for Determination of Long-Term Thermal Resistance of Closed Cell Thermal Insulating Foams |

1.4 PERFORMANCE CRITERIA

- .1 Exterior envelope is based on "Rain Screen Principle" by NRCC. This requires construction behind cladding act as an air/vapour barrier to prevent passage of moisture laden air and diffusion of water vapour. To ensure continuity of air/vapour barrier within construction specified herein and with adjacent barrier construction is part of responsibility of this Section.
- .2 Select appropriate products from list of materials on basis of their maintaining thermal value of envelope, total compatibility when incorporated into finished system while ensuring substrate conditions as well as their ability to adhere components permanently, where applicable in rigid manner and maintain flexibility where required in finished work.
- .3 Ensure insulation materials and their facings do not support fungal growth when tested in accordance with ASTM C1338.

1.5 QUALITY ASSURANCE

- .1 Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to site in original wrappings with labels intact and store in areas directed by Consultant.
- .2 Store insulation on raised platforms and protect with waterproof covers. Prevent exposure of insulation to sun.
- .3 Store materials inside buildings for 24 hours prior to installation.

1.7 PROTECTION

- .1 Temporarily protect installed insulation from damage and action of the elements until it is permanently concealed or protected.
- .2 Protect polystyrene insulation from sunlight.

1.8 SITE CONDITIONS

- .1 Maintain surface and ambient temperatures during application and curing of adhesive at temperature recommended by manufacturer of type of adhesive used.

PART 2 – PRODUCTS**2.1 MATERIALS**

- .1 Products of the following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - .1 Dow Chemical Canada Inc.; www.dow.com
 - .2 Owens Corning Canada LP; www.insulation.owenscorning.ca
 - .3 Roxul Inc.; www.roxul.com
- .2 Products:
 - .1 Insulation Type 1: At building foundations, in contact with soil (perimeter insulation); below slabs on grade; Extruded, expanded polystyrene with shiplapped edges: CAN/ULC-S701-05: Styrofoam SM by Dow, or Celfort 300 by Owens Corning.
 - .2 Insulation Type 2: At cavity walls and behind metal cladding; Extruded, expanded polystyrene: CAN/ULC-S701-05, Cavitymate by Dow or Celfort 200 by Owens Corning.
 - .3 Insulation Type 3: Where shown and where rigid board insulation is required but no particular type is indicated; Rigid fibrous insulation, glass fibre or mineral wool board: CAN/ULC-S-702-97; density of 48 kg/m³; minimum RSI of 0.73 per 25 mm thickness: AF530 by Owens Corning or OFI 48 by Ottawa Fibre Inc. or RXL 40 by Roxul Inc.
 - .4 Insulation Type 4: Where shown; Mineral fibre, batt or roll type: CAN/ULC-S702-1997.
 - .5 Insulation Type 5: At perimeter of windows, curtainwalls, and where shown; Foamed in place urethane: two-component polyurethane: froth/spray kit, ULC Class 1 (flame spread 25 or less): Froth-Pak by Insta-Foam Products, Inc. or Enerfoam by Abisko or Zerodraft Air Barrier Sealant by Building Resources Inc. or equivalent product by other manufacturer approved by Consultant.
 - .6 Adhesive for polystyrene insulation: Bakor 230-21; adhesive for securement of insulation to waterproofing/dampproofing membrane shall be compatible with such membranes.
 - .7 Impaling clips: zinc coated Stic-Klip with perforated base and cadmium plated speed washer by Eckel Industries of Canada Ltd., or Insul-Anchors "Spindle" by Continental Studwelding Ltd.; adhesive and mechanical fasteners as recommended by clip manufacturer.

- .8 Cavity insulation securement: supplied by Section 04 20 00 Masonry Units.
- .9 Mechanical securement system:
 - .1 Metal securement members: 41 x 13 x 0.5 mm galvanized channels: Insulok by Reach Plastics; or 48 x 13 x 0.5 mm galvanized tee: Retainer Tee by Bailey.
 - .2 Concrete/masonry anchors: Tapcon anchors of length to provide minimum 25 mm embedment of anchor.
 - .3 Fasteners to metal framing: self-drilling, self-tapping plated screws.
- .10 Vapour retarder tape: self-adhesive, minimum 50 mm wide aluminum foil tape.
- .11 Cavity Compartment seals, firestops: Sheet metal; minimum 0.9 mm thick sheet steel formed to profiles required, hot dip galvanized ASTM A653, zinc coating designation Z275.

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Surface Preparation: Ensure surfaces to receive adhesive or insulation are dry, firm, straight and free from loose material, projections, ice, frost, slick, grease, oil or other matter detrimental to bond of adhesive or uniform bedding of insulation.

3.3 INSTALLATION

- .1 Provide under this Section all thermal insulation required except where it is specified to be part of another Section.
- .2 Provide continuous uniform thermal insulation over insulated areas. Use largest practicable insulation board size, to minimize number of joints.
- .3 Where insulation is interrupted by construction elements, neatly fit insulation around such elements and pack spaces around elements with same insulation.
- .4 Moderately butt insulation boards against each other so that there are no gaps
- .5 Stagger joints at multiple layer installations.

-
- .6 Type 1 Insulation:
- .1 Provide perimeter insulation at inside or outside of foundation walls, as indicated, to minimum 600 mm below finished grade or lower where shown. Unless otherwise indicated provide 50 mm thick insulation bonded to substrate with spot adhesive application.
 - .2 Secure insulation boards mechanically with impale clips or other method approved by Consultant. Butter all edges of insulation boards with adhesive.
 - .3 Provide rigid board insulation below slabs on grade where indicated. Place insulation board on prepared, level subgrade, with joints tightly butted. Unless noted, use 50 mm thick insulation.
- .7 Type 2 Insulation:
- .1 Place insulation against air barrier, tightly fitted at joints, at perimeter of insulated areas, around ties and at other penetrations; leave no gaps or voids.
 - .2 Secure insulation boards mechanically with impale clips or other method approved by Consultant. Butter all edges of insulation boards with adhesive.
 - .3 Provide continuous 12 mm beads of Type 2 insulation adhesive applied in serpentine pattern, side to side, at back of insulation board; space beads at 150 mm o.c. Press board against air barrier and mechanically secure at each cavity wall tie, with insulation securement.
 - .3 Near wall corners, at perimeter of openings, and at other locations where cavity wall ties are not available in required location, use tapcon anchors and plastic washers for mechanical securement of insulation boards; ensure that fastener is within 150 mm of corner or jamb.
 - .4 Do not install insulation until air barrier and membrane flashings are complete and have been approved by Consultant.
 - .5 Provide vertical and horizontal cavity compartment seals spaced in accordance with NBRC recommendations. Where depth of cavity exceeds 25 mm install fire stops in accordance with OBC requirements.
- .8 Type 3 Insulation:
- .1 Secure insulation board to supporting work with adhesive bonded or mechanically fastened impale clips spaced at maximum 500 mm in each direction, unless otherwise indicated.
 - .2 Apply vapour retarder tape at board joints where foil faced board is required.
- .9 Type 4 Insulation:
- .1 Completely fill spaces with insulation, leaving no gaps or voids. Do not pack insulation tighter than manufactured density of materials.

.10 Type 5 Insulation:

- .1 Apply insulation with suitable equipment, in accordance with manufacturer's directions.
- .2 Fill designated spaces completely, leaving no voids or gaps; trim excess material.

.11 Mechanical Securement:

- .1 Space securement members at maximum 600 mm o.c. Provide additional members at openings, penetrations, corners, changes of directions and terminations to ensure firm securement and adequate support for gypsum board in all locations.
- .2 Fasten members to supporting elements maximum 150 mm from end of furring members and at maximum 600 mm at walls and at maximum 400 mm o.c. at horizontal applications.

.12 Vapour Barrier:

- .1 Staple vapour barrier to inside face of insulation. Ensure continuous vapour barrier envelope of entire building.
- .2 Staple vapour barrier securely in place at 400 oc both directions.
- .3 Lap joints 150 mm.
- .4 Tape joints with polyethylene tape.

END OF SECTION

PART 1 – GENERAL**1.1 SUMMARY**

- .1 Section Includes: Provide miscellaneous air/vapour barriers including but not limited to following:
 - .1 Air/vapour barriers required to maintain air/vapour integrity of building envelope not shown or identified on Drawings or specified under another Section;
 - .2 Coordination of work of this Section with other trades working on the building envelope.

1.2 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 04 20 00 - Masonry Units;
- .3 Section 07 21 00 – Insulation;
- .4 Section 07 92 00 – Sealants;
- .5 Section 08 41 13 - Aluminum Framed Entrances and Storefronts.

1.3 REFERENCE STANDARDS

- .1 ASTM E96/E96M-10 - Standard Test Methods for Water Vapor Transmission of Materials
- .2 ASTM E2178-11 - Standard Test Method for Air Permeance of Building Materials
- .3 CGSB 37-GP-9Ma - Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
- .4 CAN/CGSB-51.33-M89 - Vapour Barrier Sheet, Excluding Polyethylene for Use in Building Construction

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Review Contract Documents for work included under this trade 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, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

1.5 SUBMITTALS

- .1 Submit prior to ordering materials proposal in writing, indicating which membrane system is to be used. Include manufacturer's documentation verifying suitability of application for expected application conditions.

1.6 QUALITY ASSURANCE

- .1 Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- .2 Owner may obtain the services of an independent inspection agency for inspection and testing of work provided under this Section, as directed by Consultant.
- .3 Refer to Section 01 35 16 Alteration Procedures Paragraph 3.3 Progress Photographic Documentation.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Store materials in weathertight enclosure raised off the ground in an upright position so they are protected from sunlight, weather exposure, moisture, deterioration, tearing, puncturing and other damage.
- .2 Comply with manufacturer's printed recommendations for handling of materials.

1.8 ENVIRONMENTAL REQUIREMENTS

- .1 Do not perform glazing when temperature is less than 7 deg C or sash or frames are wet, damp or frosted.

1.9 WARRANTY

- .1 Manufacturer Warranty: Warrant work of this Section for period of 3 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; material remaining air and water tight.

PART 2 – PRODUCTS**2.1 MATERIALS**

- .1 Self-Adhering Vapour Permeable Air Barrier (AB-1): CAN/CGSB 51.32 and ASTM E96, a tri-laminated Woven high density polyethylene to surface film with silicone release film, 0.6 mm thick, a maximum Perm rating of 2875 ng/(Pa•s•sq m) , and maximum air leakage rate of 0.0025 L/s•m² at 75 Pa. Width minimum 450mm.
 - .1 Acceptable Products and Manufacturers:
 - .1 Blueskin VP160 by Bakor Inc.; www.bakor.com
 - .2 Sopraseal Stick VP by Soprema; www.soprema.ca
 - .3 AirOutshield SA 280 by SRP Canada Inc; www.srpcanada.ca
 - .4 ExoAir 110 by Tremco; www.tremcosealants.com
 - .5 Sealtight Airshield by W.R. Meadows; www.wrmeadows.com

- .2 Foam-In-Place Sealant (for use at window frames, door frames or penetrations in exterior assembly): to CAN/ULCS710.1, low expansion, one component, semi-flexible soft, spray-applied polyurethane foam insulation, designed for low expansion around windows and doors.
 - .1 Acceptable Products and Manufacturers:
 - .1 Zerodraft Foam Sealant, manufactured by Canam Building Envelope Specialists.
 - .2 Great Stuff Pro Window & Door Insulating Foam Sealant, manufactured by Dow Chemical Canada
 - .3 IPF Green, manufactured by Rivenco Industries Ltd.
 - .3 Membrane and Flashing Sealant: ASTM C920, Grade NS, Class 35, Use NT, M, O, A, and I; single component, capable of continuous water immersion, non-sagging type; Use Low VOC products wherever possible.
 - .1 Product: as recommended by membrane manufacturer.
 - .4 Primer: as recommended by membrane manufacturer.
 - .5 Adhesives, mastics, joint backing: as recommended by membrane manufacturer.
 - .6 Metal backing: cold rolled sheet steel, hot dip galvanized to ASTM A653, zinc coating designation Z275; unless otherwise shown, 0.9 mm thick.

PART 3 – EXECUTION

3.1 EXAMINATION

- .1 Notify Consultant in writing of any conditions which would be detrimental to the installation.
- .2 Examine surface to receive membranes to assure they are smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of work.
- .3 For window and storefront replacements at existing buildings, ensure all previous membrane and debris is removed from opening prior to commencing new work.
- .4 Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- .1 Install membrane system in accordance with manufacturer's installation instructions.
- .2 Apply membrane horizontally to exterior face of interior wythe of cavity walls and, in other locations shown on Drawings.
- .3 Completely cover substrates. Start at low point and proceed up the wall, overlapping subsequent sheets minimum 50 mm in the direction of water flow. Lap end joints minimum 100 mm.

- .4 Apply primer with roller, brush or spray equipment. Do not apply more primer than that which can be covered, on the same working day, with air barrier membrane. Recoat primed areas which are not covered with membrane the same day.
- .5 Position membrane for alignment, with protective film in place. Roll membrane back, remove film and press membrane in place.
- .6 Roll completed membrane, including seams, with suitable roller, to ensure full contact with substrate.
- .7 At masonry wall ties and at other penetrations through sheet type membrane, accurately cut, fit and seal membrane around penetrating component.
- .8 At wall openings return membrane into rough openings. Install membrane to ensure that corners of openings are sealed.
- .9 At large joint gaps between dissimilar substrate materials slightly loop sheet membrane to accommodate expected movement; for liquid applied membranes in similar situations provide and incorporate into the air barrier system an approved sheet material and install accordingly.
- .10 Leave sufficient amount of excess membrane material over the top of parapet walls and around the perimeter of openings for tie-in by others.
- .11 Cut membrane neatly around penetrations. Seal with air/vapour barrier sealant or mastic. Seal around perimeter or dissimilar materials to ensure complete and continuous seal.

3.3 SITE QUALITY CONTROL

- .1 Membrane manufacturer shall provide periodic site inspection and technical assistance to ensure work is properly executed.
- .2 Upon completion of membrane installation membrane manufacturer shall issue a report verifying that membrane installation is complete and satisfactory.
- .3 Prior to allowing membrane to be covered with other work, document installation as per Section 01 35 16 Alteration Procedures Paragraph 3.3 Progress Photographic Documentation and issue to consultant for review.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide metal flashings and trim including but not limited to following:
 - .1 Break forming and installation of pre-painted metal coping flashings;
 - .2 Sheet metal flashings at windows;
 - .3 Flashing at parapets;
 - .4 Caulking.

1.3 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 04 20 00- Masonry;
- .3 Section 06 10 00- Rough Carpentry;
- .4 Section 07 92 00 - Sealants, except where specifically stated otherwise herein.

1.4 REFERENCE STANDARDS

- .1 ASTM A167-99(04) - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- .2 ASTM A653/A653M-08 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .3 ASTM B32-08 - Specification for Solder Metal
- .4 ASTM B370-03 - Specification for Copper Sheet and Strip for Building Construction
- .5 ASTM C920-08 - Standard Specification for Elastomeric Joint Sealants
- .6 CSA B111-74(03) - Wire Nails, Splices and Staples

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Prior to commencing work for this Section, arrange for Contractor, installer and manufacturer's representative to meet on site and review conditions under which work is to be performed, installation procedures and inspect surfaces to receive this work.

1.6 SUBMITTALS

- .1 Submit minimum 300 mm long samples of typical flashings showing profile, method of locking and anchoring and corner condition, fabricated from materials specified

1.7 QUALITY ASSURANCE

- .1 Ensure work of this Section is installed by a company specializing in sheet metal flashing work with 5 years documented experience and a member in good standing of CRCA.
- .2 Conform to requirements contained in CRCA manual.

1.8 PERFORMANCE REQUIREMENTS

- .1 Appearance: neatly and evenly lay out and install components. Exposed fastening devices not permitted.
- .2 Effects of wind: resist positive and negative wind pressures without causing detrimental effects.
- .3 Water control: prevent passage of water.
- .4 Thermal movement: accommodate expansion and contraction of component parts without causing buckling, failure of joints, undue stress on fasteners and other detrimental effects.
- .5 Compatibility: components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials to prevent damage, distortion and corrosion.
- .2 Stockpile panels tilted to provide water run-off, free from ground contact on firm, level, non-staining supports extending full width of sheet and spaced not more than 450 mm (36") apart. Where possible, pile individual sheets or panel length and types separately. Cover components with opaque polyethylene sheet to protect from direct sunlight and moisture penetration. Vent to allow air movement.
- .3 Handle and store metal materials at the job site in such a manner to prevent damage to other materials, to existing building or property.

1.10 WARRANTY

- .1 At no cost to Owner, remedy any defects in work, including work of this and other Sections, due to faults in materials and/or workmanship provided under this Section of Specifications appearing within a period of 2 years from date of Substantial Performance.

PART 2 – PRODUCTS**2.1 MATERIALS**

- .1 Aluminum sheet: AA1100 or 3000 Series, anodizing quality, plain aluminum sheet; clear anodized AA M12 C22 A31.
- .2 Pre-painted Sheet Steel: Supply 1.214mm (18 ga) minimum thickness, commercial quality, Type A to ASTM A653/A653M with Z275 (G90) zinc coating designation, pre-painted with “Stelcolour Series 8000” by Stelco Inc. or “Pre-Coat System No. 8000 Series” by Dofasco Inc., finish and colour to match existing Metal Siding.
- .3 Cleats and edge strips: non-corrosive metal compatible with sheet metal, thickness as required to provide rigid support and positive securement for metal flashings.
- .4 Mechanical fastening devices: non-corrosive metal compatible with sheet metal.
- .5 Sealant: one part low modulus silicone to ASTM C920. Consultant will select colour of sealant exposed in finished work
- .6 Asphaltic paint: Alkali resistant asphalt based enamel.

2.2 FABRICATION

- .1 Shop fabricate copings, parapet vertical flashings, flashings, curb counter flashing starter clips, strips and miscellaneous flashings in accordance with CRCA recommendations and to detail indicated.
- .2 Unless otherwise indicated provide minimum sheet metal thicknesses as follows:
 - .1 Aluminum flashings: 1.024 mm (18 ga B & S).
 - .2 Aluminum locking strips: 1 mm (18 ga B & S).
 - .3 Steel flashings: 1.214 mm (18 ga).
 - .4 Steel locking strips: 1.214 mm (18 ga).
- .3 Provide components free from distortion, waves, twists, buckles and other defects detrimental to performance and appearance. Form sections square, true and accurate to size.
- .4 Form pieces in longest practical lengths. Make joints to permit thermal movement. Make flashing surfaces free from building, warp, wave, dents, oil canning or other defects.
- .5 Double back exposed edges at least 12 mm.
- .6 Seams: space seams uniformly at maximum 2.5 m o.c.. Unless otherwise indicated, use flat locked seams, lapped 25 mm. Make horizontal seams in directions of water flow. Mitre and seal corners.

- .7 Form material with standing seam.
- .8 Fabricate corners from 1 piece with minimum 450 mm long legs; seam for rigidity, seal with sealant. Make corners square and surfaces straight and in true planes.
- .9 Fabricate vertical faces with bottom edge formed outward 12 mm and hemmed to form drip.
- .10 Fabricate flashings to allow toe to extend 50 mm over roofing. Return and brake edges. Form sheet metal pans 150 mm nominal size, with 75 mm upstand and 100 mm flanges. Fill pans watertight with plastic cement.
- .11 Unless otherwise indicated, counter flashings shall completely cover base flashings.
- .12 Furnish everything necessary for complete metal flashing installation, including clips and fastening devices.
- .13 Back paint metal flashings with asphaltic paint, 0.4mm thickness.

PART 3 – EXECUTION

3.1 EXAMINATION

- .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.
- .2 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.
- .3 Verify membrane termination and base flashings are in place, sealed and secure.
- .4 Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- .1 Conform to drawing details included in CRCA manuals.
- .2 Provide metal flashings at roof perimeter, curbs, copings, penetrations, at junctions of roof to walls, at expansion joints and where shown. Unless otherwise shown provide aluminum flashings.
- .3 Protect all membrane flashings with metal counter flashings.
- .4 Clean surfaces to be covered with metal flashings of dirt and other foreign matter. Drive projecting nails flush with substrate. Do not apply metal flashings over substrates likely to cause rupture.
- .5 Provide underlay of resin sized paper under metal flashings installed over masonry, concrete or wood. Lay underlay dry as sheet metal work is installed. Secure in place and lap joints 100 mm.
- .6 Install copings, curb coverings, starter strips, (back-up plates), pipe collars and other flashings to details shown on Drawings.

- .7 Exposed fastenings will not be permitted in the Work.
- .8 Install starter strips where indicated or required to present a true, non-waving, leading edge. Anchor to back-up to provide rigid, secure installation
- .9 Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- .10 Insert flashings into reglets to form tight fit. Secure in place with plastic wedges. Seal flashings into reglets with sealant.
- .11 Where vertical portion of metal flashing exceeds 300 mm provide vertical standing seams at 600 mm o.c.
- .12 Apply plastic cement compound between metal flashings and felt flashings.
- .13 Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.
- .14 Provide and maintain continuity of air/vapour barrier to adjacent dissimilar materials. Seal to form weathertight seal between flashing and adjoining surfaces and between flashing and other work.

3.3 SITE QUALITY CONTROL

- .1 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted. Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

3.4 PROTECTION

- .1 Protect work of this Section from damage.
- .2 Protect reglets from ice formation during freezing weather.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Provide sealants including but not limited to following exterior locations:
 - .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise;
 - .2 Control joints in masonry elements;
 - .3 Joints between precast concrete elements and between precast concrete elements and adjacent work;
 - .4 Below door thresholds (double bead);
 - .5 At perimeter of door, screen and louvre frames;
 - .6 At penetrations through exterior building elements;
 - .7 Where indicated.
- .2 Provide sealants including but not limited to following interior locations:
 - .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise;
 - .2 Perimeter of exterior door, louvre and screen frames;
 - .3 Between interior door frames and wall where gap exceeds 1.5 mm or where gap is irregular;
 - .4 Control joints in masonry elements, and joints between bearing and non-bearing masonry walls;
 - .5 Building expansion joint, except where expansion joint covers are required;
 - .6 At ceramic tile control joints;
 - .7 Perimeter of firehose cabinets, access panels, and control panels;
 - .8 Between vanities/countertops and wall;
 - .9 Between interior door frame and flooring;
 - .10 Where indicated.
- .3 At interior locations use acrylic emulsion sealant except:
 - .1 At floor control joints use self levelling polyurethane;

- .2 At vanities/countertops, sills and at ceramic wall tile control joints use silicone sealant;
- .3 Where expected joint movement exceeds movement capability of acrylic emulsion sealant, use sealant specified for exterior use, as directed by Consultant.

1.3 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 04 20 00 – Masonry Units;
- .3 Section 06 10 00 – Rough Carpentry;
- .4 Section 09 21 16 – Gypsum Board.

1.4 REFERENCES

- .1 Caulking = Sealant.
- .2 ASTM C661-06(11) -Standard Test Method for Indentation Hardness of Elastomeric-Type Sealant by Means of a Durometer
- .3 ASTM C719-93(10) - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (HockmanCycle)
- .4 ASTM C834-10 - Standard Specification for Latex Sealants
- .5 ASTM C920-11 - Standard Specification for Elastomeric Joint Sealants
- .6 ASTM C1021-08 -Standard Practice for Laboratories Engaged in Testing of Building Sealants
- .7 ASTM C1248-08 - Standard Test Method for Staining of Porous Substrate by Joint Sealants

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Review Specification for 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, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of this Section.

1.6 SUBMITTALS

- .1 Prior to start of work submit digital Product information from sealant manufacturer prior to commencement of work of this Section verifying:
 - .1 Selected sealant materials are from those specified;
 - .2 Composition and physical characteristics;

- .3 Surface preparation requirements;
 - .4 Priming and application procedures;
 - .5 Suitability of sealants for purposes intended and joint design.
 - .6 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
 - .7 Verify compatibility of new materials with existing, carry out adhesion testing, testing on gasket materials to verify no discoloration takes place when sealant is in contact with gasket and whether it is necessary to totally remove (i.e. grind off) existing sealing materials. Verify with manufacturer.
- .2 Provide cured, colour samples of manufacturer's standard range of colours in each type of sealant and caulking compound for colour selection by Consultant. Submit samples of primer, bond breaker tape and joint backing material, if requested.

1.7 QUALITY ASSURANCE

- .1 Qualifications:
- .1 Provide work of this Section executed by competent installers who have a membership in good standing with SWRI and have minimum of 5 year's experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.
 - .2 Upon Consultant's request arrange for sealant manufacturer's technical representative to visit the site, investigate conditions and make recommendations in connection with work of this Section.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Delivery:
- .1 Deliver caulking and sealant materials to site in original, unopened containers with manufacturers' labels and seals intact. Labels to identify manufacturer's name, brand name of Product, grade and type, application directions and shelf life or expiry date of Product.
- .2 Storage:
- .1 Store materials in a dry area having an ambient temperature within limitations recommended by material manufacturer.
 - .2 Do not use caulking and sealant materials that have been stored for period of time exceeding maximum recommended shelf life of materials.

1.9 SITE CONDITIONS

- .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. Maintain minimum temperature of application during application and for 8 hours after application. Consult manufacturer for specific instructions before proceeding and obtain Consultant's approval
- .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.

1.10 WARRANTY

- .1 At no cost to Owner remedy any defects in work, including work of this and other Sections, due to faults in materials and workmanship provided under this Section appearing within a period of two (2) years from date of Substantial Performance.

PART 2 – PRODUCTS**2.1 MANUFACTURERS**

- .1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - .1 BASF Construction Chemicals, LLC; www.buildingsystems.basf.com
 - .2 CPD Construction Products; www.cpd.com
 - .3 Dow Corning; www.dowcorning.com
 - .4 Euclid Chemical Canada Ltd.; www.euclidchemical.com
 - .5 Momentive Performance Materials; www.momentive.com
 - .6 Sika Canada Inc.; www.sika.ca
 - .7 Tremco Canada; www.tremcosealants.com
 - .8 W.R. Meadows of Canada; www.wrmeadows.com

2.2 MATERIALS

- .1 Sealant materials:
 - .1 Exterior sealant for vertical joints: two-part medium modulus silicone sealant with joint movement capability of $\pm 50\%$; custom colour selected by Consultant: ASTM C920, Type S, Grade NS, Class 25, uses NT, G, A, O: standard of acceptance: Dow Corning 790 Silicone Building Sealant.
 - .2 Interior sealant for vertical joints: one part acrylic latex with joint movement capability of $\pm 7 \frac{1}{2}\%$, paintable: ASTM C834 Type OP, Grade -18°C, standard of acceptance: Tremflex 834.

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- .3 Interior sealant for horizontal joints: multi-component, self levelling, chemically curing polyurethane: ASTM C920, Type M, Grade P, Class 25: Standard of acceptance: Tremco THC-900.
 - .4 Interior sealant for wet locations: mildew-resistant silicone formulated with fungicide: ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A: standard of acceptance: Dow Corning 786 Mildew Resistant Silicone Sealant.
 - .5 Colours: selected by Consultant from manufacturer's standard colours.
 - .2 Primers, thinners, cleaners: as recommended by sealant manufacturer, non-staining type.
 - .3 Premoulded backup for sealant: non-gassing closed cell foam rope, compressed 25% when in joint: Sof-Rod by Tremco, or Cera-Rod by W.R. Meadows.
 - .4 Bond breaker: closed cell polyethylene or vinyl foam tape, self-adhering one side.
 - .5 Performance:
 - .1 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 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.

PART 3 – EXECUTION

3.1 EXAMINATION

- .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.
- .2 Verify joint surfaces are clean, sound, free of defects and dimensions are within sealant manufacturer's size requirements.
- .3 Proceed with installation only after unsatisfactory conditions have been corrected.
- .4 Do not apply sealant to masonry until mortar has cured.
- .5 Preinstallation Testing: Before any sealing work is commenced, test materials for indications of staining or poor adhesion.
- .6 Start of work implies acceptance of conditions.

3.2 PREPERATION

- .1 Clean and prepare joints to be caulked to produce clean sound surfaces for sealant adhesion.

- .2 Remove previous caulking, dust, oil, grease, water, frost, loose mortar and other foreign matter. Remove loose particles by blowing joint out with compressed air.
- .3 Chemically clean non-porous surfaces such as metal and glass, taking care to wipe solvents dry with a clean cloth. Use solvents recommended by sealant manufacturer.
- .4 Clean porous surfaces such as masonry, concrete and stone by mechanical abrading.
- .5 Surfaces adjacent to joints to be primed and which may be stained by primer shall be masked with tape before primer is applied.
- .6 Prime joints in accordance with sealant manufacturer's recommendations. Apply primer before installing premoulded backup.
- .7 Install premoulded backup in joints 6 mm and more in width. Roll rope type backup into joint, do not stretch or braid. Install bond breaker in joints less than 6 mm in width.
- .8 Protect adjacent surfaces from stains and contamination. Make good any damage caused.

3.3 INSTALLATION

- .1 Do not apply firestop material to surfaces previously painted or treated with sealer, curing compound, Apply sealants under pressure using suitable equipment. Gun nozzle shall be of proper size to fit, and seal joint.
- .2 Force sealant into joints in full bead, making certain that void free contact is made with sides of joint. Tool joints to produce a slightly concave surface.
- .3 Caulking must appear as a concave recessed joint, free of ridges, wrinkles and embedded foreign matter. Caulking shall not spread or bulge beyond surfaces on each of joint.
- .4 Apply sealants in accordance with following table:

<u>Joint Width</u>	<u>Sealant Depth</u>
5 mm	5 mm
10mm	5mm
15mm	7mm
20mm	10mm

- .5 **If the finished caulking joint width, interior or exterior, exceeds 15mm in total** Clear Anodized Aluminum trim is required to be installed. Approval by consultant required. Refer to drawings for locations of aluminum covers required regardless of joint width.
- .6 Vent exterior joints as directed by Consultant.

3.4 SITE QUALITY CONTROL

- .1 Independent inspection and testing company may be appointed and paid for by Owner to carry out inspection and testing as directed by Consultant.
- .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 Consultant.

- .3 Tests may include sampling of installed Product where adhesion, cohesion or reversion failure is suspected.
- .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
- .5 Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.
- .6 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.

3.5 CLEANING

- .1 Immediately clean adjacent surfaces which have been soiled and leave work in neat, clean condition. Remove excess materials, compounds smears or other soiling resulting from application of sealants. Use manufacturer recommended cleaners and solvents. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces

3.6 PROTECTION

- .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.
- .2 Maintain protection securely in place until completion of Work. Remove protection when so directed by Consultant.

3.7 SCHEDULE

- .1 Apply sealant at the following exterior locations:
 - .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.
 - .2 Control joints in masonry elements.
 - .3 Below door thresholds (double bead).
 - .4 Penetrations through exterior building elements.
 - .5 Where indicated.
- .2 Apply sealant at the following interior locations:
 - .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.
 - .2 Perimeter of exterior and interior door and screen frames (both sides).
 - .3 Control joints in masonry elements, and joints between bearing and non-bearing masonry walls.

- .4 Porcelain/Ceramic tile control joints.
- .5 Perimeter of firehose/extinguisher cabinets, access and control panels.
- .6 Between vanities/countertops and wall.
- .7 Between sills and window frame.
- .8 Where shown.
- .3 At interior locations use acrylic emulsion sealant except:
 - .1 At floor control joints use polyurethane sealant.
 - .2 At vanities/countertops and at ceramic wall tile control joints use silicone sealant.
 - .3 Where expected joint movement exceeds movement capability of sealant, use sealant specified for exterior locations as directed by Consultant.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Supply and install aluminum doors, frames and entrances including, but not limited to, the following:
 - .1 Aluminum entrance doors and frames;
 - .2 Sealants;
 - .3 Supply direct to other Sections anchors, inserts and items required to be built into work of other Sections.

1.3 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 07 92 00 - Sealants, except where specifically stated otherwise herein;
- .3 Section 08 71 00 - Door Hardware;
- .4 Section 09 91 00 – Painting;
- .5 Wiring and Conduit of electronic hardware in frame; Electrical Drawing.

1.4 DESIGN AND PERFORMANCE STANDARDS

- .1 Design entrance systems to withstand, without any detrimental effects to appearance and performance, wind loads and temperature range expected in geographical area of this project (OBC climatic information 50 year probability), unless specified otherwise.
- .2 Design systems to accommodate without detrimental effects on appearance and performance of system.
 - .1 Positive and negative wind loads.
 - .2 Thermal expansion and contraction of systems components.
 - .3 Movement, deflection and creep of building structural frame.

- .3 Limit deflection of component parts under maximum design load to 1/175 of span or less if required by glass manufacturer.
- .4 Exterior screens:
 - .1 Structural performance shall be based on CSA 157-05 "Strength Design in Aluminum" and a maximum deflection of 1/175 of the span.
 - .2 Air infiltration shall not exceed $0.0003 \text{ m}^3 / \text{s-m}^2$ when tested in accordance with ASTM E283 at a pressure differential of 75 Pa.
 - .3 There shall be no water infiltration when tested in accordance with ASTM E331 with a pressure differential of 300 Pa.
 - .4 Thermally, the grid members shall have a condensation resistance equal to, or better than, the area along the bottom of a 25 mm thick sealed glass unit with standard metal spacer edge construction.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordinate with related work of other Sections including, but not limited to: door, frame, hardware and electrical. Be responsible to provide adequate reinforcing, clearances, rebates and brackets for hardware specified and for accurate installation of door and hardware on site.

1.6 SUBMITTALS

- .1 Shop Drawings:
 - .1 Visit the site to confirm appropriate existing dimensions and site conditions prior to the submission of shop drawings. Notify the Consultant of any discrepancies prior to completing shop drawings.
 - .2 Submit digital door, frame and hardware shop drawings to Consultant for review. Shop drawings released to Consultant for review shall contain hardware trade's review stamp and acceptance signatures.
 - .3 Shop drawings to indicate relation to adjoining work and location, construction and back-up, joint sealant, interior structure and/or reinforcements, door and glazing modules, head and frame details, extrusion sections, glazing and glass stop details, thermal break sections and vinyl or neoprene mouldings and anchorage and assembly fixings. Materials used for every component must be clearly indicated on Shop Drawings.
 - .4 Shop drawings for screens required to be designed as guards to meet loading requirements in accordance with Part 4 of the Ontario Building Code, shall bear the seal of a structural engineer who is licensed in the Province of Ontario and responsible for the design. Engineering design shall include, but not limited to, framing, glazing, attachment of frame to building and all other structural components.

- .2 Samples:
 - .1 Submit two sets of samples minimum 50mm x100mm of each type of metal finish specified.
- .3 Progress Photographic Documentation:
 - .1 Contractor to provide to the Consultant a daily photographic documentation report for the progress of work at the following key stages:
 - .1 Removal of existing windows, doors and frames;
 - .2 Removal of vapour barrier and insulation;
 - .3 Installation of insulation;
 - .4 Installation of blue skin.
 - .2 Contactor's photographs are to be in pdf format, labeled by room, be clear and of a scale that allows viewing of the specific conditions.
 - .3 Contractor to identify any unforeseen existing conditions discovered during the four stages of documentation when the photos are emailed.
 - .4 Contractor to provide a floor plan is to accompany the photos to identify the room name and day work completed.
- .4 Closeout Documents:
 - .1 Provide operation and maintenance instructions for aluminum screens, doors and hardware.

1.7 QUALITY ASSURANCE

- .1 Execute the work of this Section by installers with a minimum of 5 years experience in the application of Products, systems and assemblies specified and with the approval and training of the Product Manufacturer.
- .2 Fabrication tolerances: overall height, width and diagonal dimensions of frames shall be within the following tolerances:
 - Dimension of 1.8 m and less: +/- 1.5 mm
 - Dimension more than 1.8 m: +/- 3 mm
- .3 Caulking installer to be a specialized installer with a minimum of 5 years experience.
- .4 Coordination and approval by the hardware distributor is required prior to submission of shop drawings.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle and store fabricated components to prevent permanent distortion, corrosion and damage. Coordinate storage location with Owner.
- .2 Remove wrappings from doors upon delivery to site and inspect for any damage. Replace any damaged or bent material immediately.
- .3 Handle and store metal materials at the job site in such a manner to prevent damage to other materials, to existing building or property.

1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Sealants are not to be installed when ambient temperature is less than 5 degrees C during and forty-eight hours after installation.

1.10 WARRANTY

- .1 At no cost to the Owner, correct defective Work within a five (5) year period after Substantial Completion. For the purposes of this paragraph, defects shall include, but not limited to the following:
 - .1 Water infiltration in excess of requirements specified.
 - .2 Air infiltration / exfiltration in excess of requirements specified
 - .3 Deflection of system components in excess of requirements specified.
 - .4 Failure of joint seal.
 - .5 Cracked glass (except where caused by vandalism).
 - .6 Delamination, cracking, blistering, excessive fading of metal finishes.
- .2 At no cost to the Owner, warrant aluminum doors against defects for a period of ten (10) years from the date of Substantial Completion.
- .3 At no cost to Owner, replace factory sealed insulating window units should cracking of glass or any other breakdown or failure of glass units occur or should obstruction of vision develop due to dust or film forming on inner glass surfaces within a period of ten (10) years from date of Substantial Performance.
- .4 Include coverage for complete system for failure to meet specified requirements.

PART 2 – PRODUCTS**2.1 MATERIALS****.1 General:**

- .1 Material: Aluminum Association Alloy AA-6063-T5 for extruded shapes, commercial quality AA-1100-H14 aluminum sheet for formed shapes.
- .2 Hardware: Doors complete with weatherstripping around frame and along bottom of door and aluminum sill. Prepare doors to templates provided by hardware supplier for butt hinges, exposed overhead closer, lock cylinder and flushbolt.
- .3 Closures, Cover Plates and Trim: Extruded aluminum and sheet stock formed or brake shaped to profiles shown on Drawings (minimum 3mm thick) and as required to finish around windows.
- .4 Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type to acceptance of Consultant.
- .5 Screws, Bolts and Fasteners: Self tapping cadmium plated steel for aluminum to aluminum contact and stainless steel for aluminum to steel contact.
- .6 Compressible Filler: Supply "Unifoam R1009" by Goodco Limited.
- .7 Temporary Strips and Safety Markings: Supply 25 mm wide, light reflecting, easily removable, pressure sensitive tape applied over glass lites in doors.

.2 Systems:**.1 Framing:**

- .1 Acceptable Non-Fire Rated Systems as follows:
 - .1 Exterior: Wide Stile Series 655 Framing by Windspec.
 - .2 Products to be supplied and installed by Windspec.
 - .3 No other products or installers will be accepted.
- .2 Thermal Break Material: Polyvinyl chloride, of semi-rigid durometer hardness of 80, plus or minus 5, located on external side of glass pane
- .3 Size units to allow for structural deflection of surrounding construction;
- .4 Fastenings shall be concealed;
- .5 Glazing stops shall be snap-on-type, without exposed fasteners;

- .6 Internal weep drainage system;
 - .7 Reinforce members as required to withstand loads and to maintain deflection within allowable limited;
 - .8 Closures, covers and trim shall be extruded or formed to profiles shown and unless otherwise shown, minimum 3 mm thick;
- .2 Doors:
- .1 Acceptable Non-Fire Rated Systems as follows:
 - .1 Exterior: Wide Stile Series 500HTP Door by Windspec.
 - .2 Products to be supplied and installed by Windspec.
 - .3 No other products or installers will be accepted.
 - .2 Construct doors of minimum 4.8 mm thick porthole extrusions, with all fastenings and connections concealed.
 - .3 Vertical edge profile: bevelled or rounded;
 - .4 Glazing stops shall be snap-on-type, without exposed fasteners;
 - .5 Door Weatherstripping: Material designed for easy removal and replacement when worn; silicone treated twin-tuft pile at jambs and heads and 2.4 mm white vinyl strips at toes, complete with adjustable fixing to ensure a full "wipe" of the thresholds below;
 - .6 Where doors are incorporated into window wall provide suitable subframes;
 - .7 Provide cutouts, recesses, mortising required for finish and operating hardware;
 - .8 Provide heavy duty reinforcing at all door and frame hardware fastening points;
 - .9 Internally reinforce framing members where work of other Sections is to be fastened thereto;
 - .10 Provide rails and transoms to sizes and profiles shown;
 - .11 Prepare doors / frames for automatic door operator; provide head member of sufficient size to accommodate operator;
- .3 Insulated Panels (IAP):
- .1 Prefabricated insulated panels, as manufactured by Mapes Industries or Citadel Architectural (GlazeGuard 1000) as distributed by SRP Building Products Inc.:
 - .1 Exterior skin: minimum 0.4mm thick aluminum sheet with smooth surface,

ALUMINUM FRAMED ENTRANCES AND STORE FRONTS

bonded to 3mm thick tempered hardboard stabilizer substrate. Finish: anodized to match framing.

- .2 Insulating Core: expanded polystyrene rigid insulation to CGSB-51-GP-20M Type2.
 - .3 Interior skin: .5mm thick aluminum sheet with clear anodized finish, bonded to 3.2mm thick hardboard stabilizer substrate.
 - .4 Overall thickness: 51mm (2") minimum.
- .4 Flashings:
- .1 Aluminum; 1.27 mm thick, secured with concealed fastening method.
 - .2 Finish: To match framing sections where exposed.
- .2 Finish:
- .1 Colour Anodic Coating: all exposed components, AAMA 611 , Class I, AA-M12C22A44.
 - .1 Colour: Clear Anodized.
 - .2 Location: Interior and exterior exposed aluminum surfaces.
 - .2 Apply one (1) coat of bituminous paint to concealed steel and aluminum surfaces in contact with cementitious or dissimilar materials.
 - .3 Shop and Touch-Up Primer for Steel Components: SSPC-Paint 25, zinc oxide alkyd primer.
 - .4 Touch-Up Primer for Galvanized Steel Surfaces: MPI #18, inorganic zinc-rich primer.
 - .5 Extent of Finish:
 - .1 Apply factory coating to all surfaces exposed at completed assemblies.
 - .2 Apply finish to surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - .3 Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.
- .3 Glass and Glazing:
- .1 Setting blocks: Neoprene, Shore "A" Durometer hardness of 70 to 90 points; spacer shims, 40 to 50 points, as recommended by glass manufacturers.
 - .2 Glazing sealant: one part polysulphide meeting requirements of CAN/CGSB-19.13-M87 or as recommended by window and glass manufacturer.

- .3 Glazing tape: preshimmed polyisobutylene: Polyshim Tape by Tremco.
 - .4 Glazing wedges and splines: solid extruded neoprene or EPDM having Shore "A" Durometer hardness of 50 to 70 points as recommended by window manufacturer.
 - .5 Tempered Glass in all glazing (TGL / FSG): Clear transparent fully tempered glass conforming to CAN/CGSB-12.1- M90. 1, minimum 6 mm (1/4") thick. Ensure surface compression is equal to or greater than 69 MPa (10 000 psi). Tempered glass identification must be sandblasted into glass and shall be visible after installation.
 - .6 GL Low emissivity (Low-E) glass; Solarban 60 clear by PPG. Tempered glass: CAN2-12.1-M79, fully tempered, and unless noted 6 mm thick.
 - .7 Double glazed insulating units (FIGU) (all exterior glazing): factory sealed units meeting requirements of CGSB-12.8-M76, clear tempered float glass inside and grey tinted tempered glass outside, nominal thickness 25 mm, with warm edge spacer, space between glass filled with argon gas; low-E coating on No. 2 surface (max U-value 0.24): PPG Solarban 60, clear or equivalent product by other manufacturer approved by Consultant.
 - .8 Spandrel glass (BSP): Float glass heat strengthened or tempered (if recommended by glass manufacturer); backpainted with 2-coat fluoropolymer paint system: PPG Duranar DTG XL; colour selected by Consultant.
 - .9 Silk Screened Simulated Acid Etch Glass (FSSG): fully tempered Prel-Design by Prelco. Colour to be opaque - White PC-9912. To be installed on No. 2 surface of insulated glazing unit.
- .4 Sealant:
- .1 Multi-component conforming to ASTM C920, Type M, Grade NS for sealant to be incorporated between aluminum framing and adjacent structures. Colours to be selected by Consultant from standard colour selection. Acceptable products: Dow Corning 790.
 - .2 Supply non-hardening, non-skimming, non-sagging, non-bleeding polyisobutylene or partially vulcanized rubber base sealant for use in concealed-sealing of thin joints in metal work.
 - .3 Joint backing to be non-gassing foam rope, compressed minimum 25% installed. Acceptable product: Sof-Rod by Tremco.

2.2 FABRICATION

- .1 Form sections true to detail, free from defects impairing appearance, strength and durability.
- .2 Ensure frames are tubular extruded shapes with sharp, well defined corners.
- .3 Ensure overall assembled profiles are as detailed on Drawings.
- .4 Fabricate frames with continuous thermal breaks. Locate thermal break on exterior side of the glazing as detailed on Drawings and hold by snap-in methods without the use of any metallic fasteners which could reduce the effectiveness of the thermal barrier.

- .5 Corners of formed work must be mitred and closely fitted. Apply back-up sealants designed for this purpose on inside of joints in aluminum work by this Section.
- .6 Anchorages must be attached to warm side.
- .7 Carry out welding with argon shielded electric arcs to ensure complete fusion of the metal.
- .8 Ensure aluminum doors have bevelled glazing beads designed for neoprene glazing system; except at exterior doors with insulating lites, use glazing system compatible with secondary sealant of the glass unit.
- .9 Equip doors with full weatherstripping at perimeter. Install weatherstripping throughout full length and width of doors at jambs and heads.
- .10 Fabricate doors and frames complete with necessary internal reinforcements, cutouts, recesses, mortising or milling operations required for a rigid assembly and to accommodate door hardware. Ensure connections have adequate strength.
- .11 Fabricate frames with joints accurately fitted and securely joined together in a manner to ensure tightly fitting joints. Internally caulk and seal corners of frames and joints exposed to water penetration using a material compatible to resist flow at the high surface summer temperatures to be experienced by the metal.
- .12 Fabrication Tolerances:
 - .1 Maximum Variation from Plumb: 1.5 mm/m non-cumulative or 1.5 mm per 3 m/16 inches per 10ft, whichever is less.
 - .2 Maximum Misalignment of Two Adjoining Members Abutting in Plane: 0.8 mm/32 inch.

PART 3 – EXECUTION

3.1 EXAMINATION

- .1 Verify actual site dimensions, floor conditions in path of door swing and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- .2 Commencement of work implies acceptance of previously completed work.
- .3 Return any existing hardware to Owner.

3.2 INSTALLATION

- .1 Frames:
 - .1 Erect and secure framing plumb, square and level, free from warp, twist and superimposed loads.

- .2 Anchor framing to supporting building elements; provide brackets, anchors and clips as required. All devices for anchoring shall have sufficient adjustment to permit correct and accurate alignment. After alignment rivet, weld or otherwise positively lock anchoring devices to prevent movement other than that required to accommodate expansion, contraction and deflection.
 - .3 Anchor intermediate vertical frame members to structure above as required. Where support for intermediate vertical frame members is not available directly above head, provide frame extensions to structure above. Provide flexible connection at structure to allow for movement.
 - .4 Provide necessary inserts to be built into work of other Sections as required for anchorage of framing.
 - .5 Set frame members in bedding compound to ensure watertight assembly.
 - .6 Metal to metal joints between abutting components shall be sealed weathertight.
 - .7 Use concealed fastenings and anchorages in all locations. Exposed fastenings, where unavoidable, must be clearly identified on shop drawings, and require Consultant's approval prior to fabrication of work.
 - .8 Install foam-in-place insulation in all voids around windows and door frames and as shown on drawings.
- .2 Doors:
- .1 Install doors plumb, square, level, free from warp, twist and superimposed loads.
 - .2 Secure work adequately and accurately to structure in required position, in a manner not restricting thermal movement.
 - .3 Provide compressible filler over aluminum work at locations shown on Drawings.
 - .4 Install doors complete with finish hardware supplied by hardware supplier, in accordance with templates supplied by same.
 - .5 After installation of hardware, have hardware supplier check operation of hardware. Do readjustments as required.
 - .6 Use aluminum or stainless steel screws, nuts, bolts, washers, rivets and other fastening devices, colour to match doors and frames where exposed to view.
 - .7 Coordinate with Division 26 for required power connection and wiring to automatic door operator and controls.
- .3 Covers, Closures and Trim:
- .1 Provide aluminum covers, closures and trim at all interior and exterior wall joints to conceal caulking and to provide complete and finished installation.
 - .2 Wherever possible, provide concealed fastenings.

- .4 Glazing:
 - .1 Use extruded gaskets for door glazing and of type compatible with secondary sealant in insulating glass unit locations.
 - .2 Thoroughly wipe surfaces receiving glazing materials with a cloth dampened in xylol to assure a clean surface.
 - .3 Place setting blocks at quarter points from each corner, centre sealed unit in opening and press firmly against tape. Provide isolation tape at edges of laminated glass to prevent staining of interply plastic from glazing materials. Roll-in inside resilient extrusion.
 - .4 Caulking: At interior and exterior joints between aluminum framing and adjacent work of others execute the following work:
 - .5 Install backer rod over compressible filler material or perimeter blocking to provide sealant joints of proper form, thickness to width ratios and bond break at back side of sealant. Where backer rod cannot be used or is not shown provide bond breaker tape to back side of sealant joint substrate.
 - .6 Clean substrate surfaces where sealant is to bond and apply sealant primers as recommended by sealant manufacturer.
 - .7 Caulk joints continuous to produce weatherproof and visually acceptable joint installation.

3.3 SITE QUALITY CONTROL

- .1 Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

3.4 CLEANING

- .1 Maintain aluminum work in a clean condition throughout construction period, so it will be without deterioration or damage at time of acceptance. Select methods of cleaning which will promote achievement of uniform appearance and stabilized colours and textures for materials that weather or age with exposure.
- .2 Immediately before time of Substantial Performance, clean aluminum work thoroughly, inside and out. Demonstrate proper cleaning methods to Owner during this final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials of the work and submit 2 copies to Consultant.
- .3 Remove protective covering and coating from aluminum surfaces, inside and out and clean surfaces, remove labels, stripes and protective devices and polish glass surfaces, immediately prior to final acceptance of the work by Consultant.

3.5 PROTECTION

- .1 Protect the work of this Section from damage. Protect work of other trades resulting from the work of this Section.

- .2 Provide at factory, strippable coatings on exposed surfaces of aluminum. Ensure coating and protective wrappings remain on surfaces through period other trades' works proceed on the building and removed by this trade on completion of building.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 08 41 13 – Aluminum Framed Entrances & Storefronts;
- .3 Electrical Drawings – Power Requirements.

1.3 REFERENCE STANDARDS

- .1 CAN/ULC-S104-10 - Standard Method for Fire Tests of Door Assemblies.
- .2 CAN/ULC-S132-07 - Standard for Emergency Exit and Emergency Fire Exit Hardware.
- .3 CSDMA (Canadian Steel Door Manufacturers Association).
- .4 DHI (Door and Hardware Institute Canada) - AHC and EHC certification programs.
- .5 DHI (Door Hardware Institute) - A115 series.
- .6 DHI - Recommended Locations for Architectural Hardware for Flush Wood Doors (1993).
- .7 BHMA (Builders Hardware Manufacturers Association) - A156 Series Standards.
- .8 NFPA 80 - Standard for Fire Doors and Other Opening Protectives, 2013 Edition.
- .9 NFPA 252 - Fire Tests of Door Assemblies, latest Edition.
- .10 UL 10B-2008 - Fire Tests of Door Assemblies, latest Edition
- .11 UL 305-2012 - Standard for Panic Hardware, latest Edition

1.4 SUBMITTALS

- .1 Shop Drawings:
 - .1 Upon consultant's request, submit samples of finish hardware.
 - .2 Prepare and submit a digital copy of a detailed hardware schedule and manufactures catalogue cuts.

- .3 Provide confirmation of locations and mounting heights of each hardware item.
- .4 The hands of doors shall be shown on the hardware schedule.
- .5 The degree of opening for doors with overhead holders, closers and other affected hardware shall be included in the Hardware Schedule for approval.
- .6 Furnish other Sections with templates required for hardware preparation and installation.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit Operation and Maintenance data including; operating hardware, lubrication requirements and inspection procedures related to preventative maintenance.

1.6 QUALITY ASSURANCE

- .1 Meet requirements of Ontario Building Code and other applicable regulations.
- .2 Manufacturer to have a minimum of five (5) years successful experience in the fabrication of automatic doors of the type required for this project and be AAADM Certified with proof of certification provided if requested.
- .3 Installer performing the work of this section must have a minimum of five (5) years' experience..
- .4 Upon completion of the finish hardware installation, hardware supplier's qualified representative shall inspect the work and shall certify in writing that all items and their installation are in accordance with the requirements of the Contract Documents and are functioning properly. This document shall be included in the maintenance materials.
- .5 Hardware supplier is to be a current member of DHI (Door and Hardware Institute) and have within its employ Certified Door Hardware Technicians and an Architectural Hardware Consultant or equivalent to provide services as required related to this scope of work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver each hardware item packaged separately in individual packaging with necessary instructions and installation templates.
- .2 Mark each hardware package with Hardware Schedule Heading Number, Door Number and Description of location within scope of work.
- .3 Store hardware in dry, lockable area.

1.8 WARRANTY

- .1 Continuous Hinges - Lifetime Warranty
- .2 Mortise Hinges - Lifetime Warranty
- .3 Cylindrical Locksets - Lifetime Warranty
- .4 Exit Devices – Ten (10) Year Warranty
- .5 Door Closers – Thirty (30) Year Warranty

- .6 Automatic Door Operators One (1) Year
- .7 Balance of items standard One (1) year

PART 2 – PRODUCTS

2.1 GENERAL

- .1 Supply and install of door hardware is to be included in the contract as per Hardware Schedule Sets included at the end of this Section.
- .2 Hardware shall comply with requirements of jurisdictional authorities.
- .3 Confirm all kick plate and threshold sizes before ordering them to ensure they fit the new doors stiles and existing threshold conditions.
- .4 Do not use wall stops on drywall.
- .5 Exposed screws for installation hardware shall have Phillips or Robertson heads.
- .6 Confirm degree of swing for door holders and closers based on existing condition.
- .7 Overhead stop: where wall stops cannot be used; surface mounted except where door closer necessitates concealed mounting.
- .8 Construction door Lock keying system to be BEST Cylinders white core keyed alike; permanent cores will be provided by the Owner.
- .9 Panic hardware to include key lock with cylinders.
- .10 Removable mullions to be key locked type with a black anodized aluminum finish surface at all locations.
- .11 All demolished hardware to be turned over to the Owner.
- .12 Contractor to hire and coordinate the TLDSB's Security Consultant to remove and re install all access control hardware as part of the cash allowances.

PART 3 – EXECUTION

3.1 EXAMINATION

- .1 Prior to installation, hardware supplier to visit the site to verify that doors and frames are ready to receive work and dimensions are as indicated on approved Shop Drawings. Any discrepancies are to be identified to the Consultant prior to installation.
- .2 For hardware installed on existing doors and/or frames, prior to submitting shop drawings, hardware supplier shall site verify that the new hardware is compatible with existing doors and frames. Any discrepancies shall be identified to the Consultant on the shop drawings.

3.2 INSTALLATION

- .1 Meet requirements of DHI A115.1G-94. "Installation Guide for Doors and Hardware".
- .2 Hardware door prep and installation to be completed by the door manufacturer. Install finish hardware in accordance with hardware supplier's directions. Ensure that hardware is installed correctly. Issue instructions, if required, to related Sections.
- .3 Contractor's shop drawing approval by the Consultant of locations and mounting heights of finish hardware required prior to installation.
- .4 Installation of panic hardware to be centered on the mid rail of the door. At no time should the panic hardware be visible through door glass. Door shop drawings to confirm mounting height for Consultant approval.

3.3 PROTECTION

- .1 Upon completion of installation, protect hardware from potential damage due to adjacent work.

3.4 SCHEDULE

- .1 Finishes:
 - .1 Refer to Spyder Hardware Schedule following this specification section.
- .2 Manufacturers:
 - .1 Refer to Spyder Hardware Schedule following this specification section for approved suppliers. No substitutions will be acceptable.
- .3 Schedule:
 - .1 Contractor to provide cylinders and Construction cores. It is required to be BEST- COLOUR CODED White Cylinders colour coded core keyed alike. Permanent cores will be provided by the Owner.
 - .2 Refer to Spyder Hardware Schedule following this specification section.

END OF SECTION

DOOR HARDWARE

08 71 00



PROJECT: VK Greer PS Door Replacement
Utterson, ON



ARCHITECT:

24 Morgan Heights Drive
Huntsville, ON

Prepared By: Kaitlyn Mallany

Date: May 5, 2026

Revised: May 19, 2026 **Updates - May 19th Meeting**

Architectural Hardware Finishes

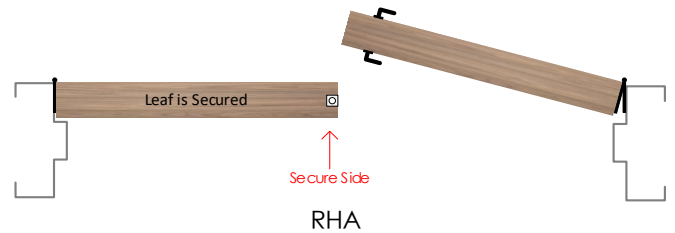
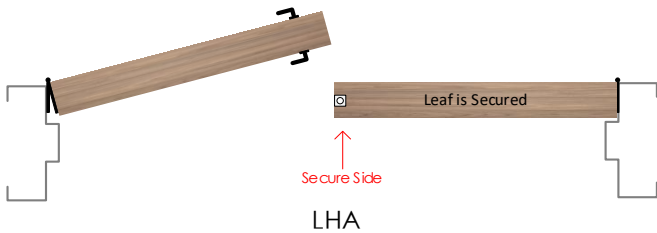
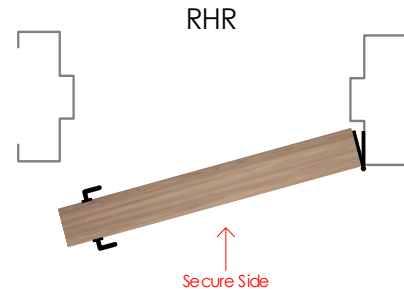
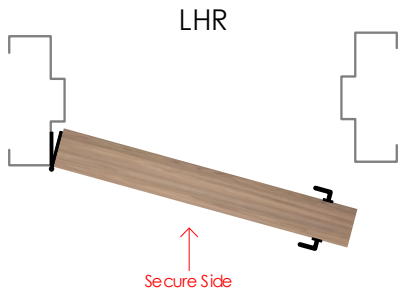
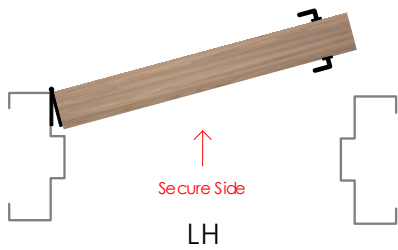
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Clear Anodized				628	689	US28
Satin Nickel	646		619	670		US15
Polished Nickel	645		618	669		US14
Satin Stainless Steel		630				US32D
Polished Stainless Steel		629				US32
Satin Chrome	652		626	702		US26D
Polished Chrome	651		625	672		US26
Satin Brass	633		606	667	678	US4
Polished Brass	632		605	666	677	US5
Satin Bronze	639		612	668	680	US10
Oil Rubbed Bronze	640		613	703	695	US10B
Flat Black / Anodized Black	631		622	671	693	US19

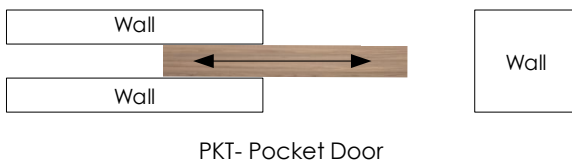
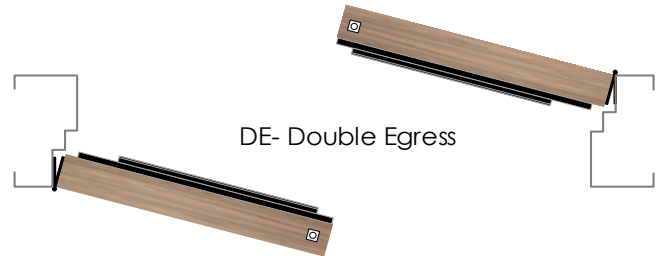
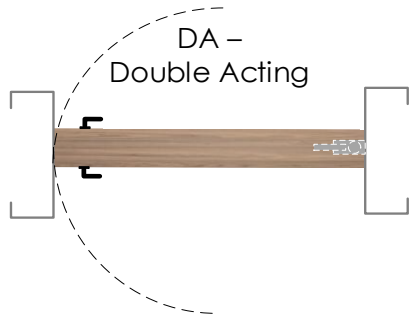
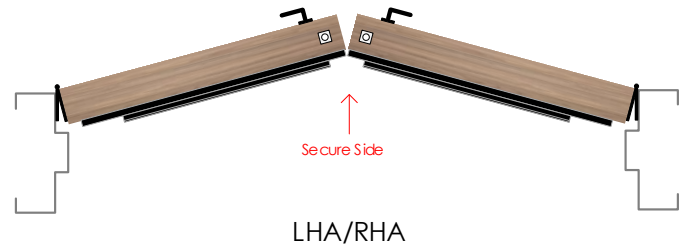
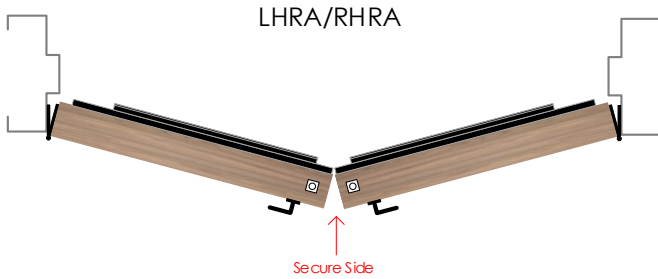
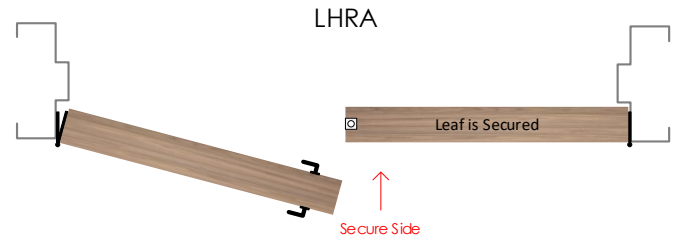
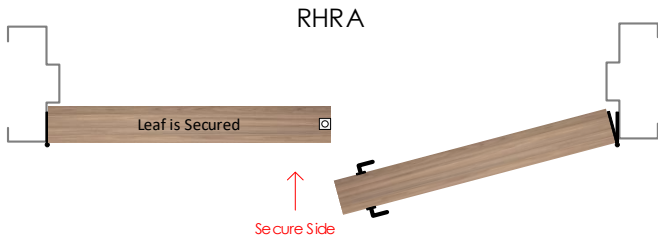
Door Handing's

Abbreviations

RH = Right Hand	RHA = Right Hand Active	SS = Single Slider
LH = Left Hand	LHA = Left Hand Active	BP = Bi-Parting Slider
RHR = Right Hand Reverse	RHA/LHA = Right & Left Hands Active	BF = Bi-Folding Slider
LHR = Left Hand Reverse	RHRA/LHRA = Right & Left Hand Reverse Active	TS = Telescopic Slider
RHRA = Right Hand Reverse Active	DA = Double Acting	PKT = Pocket Slider
LHRA = Left Hand Reverse Active	DE = Double Egress	

NOTE: The handing of a swing door is determined by placing yourself on the secured or keyed side of the door.





Symbols



- Door has a fire rating and all associated hardware must have a fire label to suit. Must comply with local requirements.



- Door is automatic and is equipped with an auto operator. Door must meet local barrier free codes



- Door has an electrical requirement and requires power to be brought to the appropriate location above the door or to the latch, for either security or barrier free applications. Refer to security & electrical drawings for further information.



- Door requires security card access. Refer to security / electrical drawings for further information.

Abbreviations

Door:

HMD = Hollow Metal Door
IHMD = Insulated Hollow Metal Door
ALD = Aluminum Door
SSD = Stainless Steel Door
ISSD = Insulated Stainless Steel Frame
STL = Steel Door
IC-ALD = Insulated Clad Aluminum Door
SCWD = Solid Core Wood Door
HCWD = Hollow Core Wood Door
FGD = Frameless Glass Door
FRP = Fiberglass Reinforced Plastic Door
OHD = Overhead Door

Frame:

HMF = Hollow Metal Frame
ALF = Aluminum Frame
Cased Open HMF = Cased Open Hollow Metal Frame
SSF - Stainless Steel Frame
STL = Steel Frame
WDF = Wood Frame
Cased Open WDF = Cased Open Wood Frame
Cased Open Drywall = Cased Open Drywall

Fire Ratings:

0 HR – Zero Hour Fire Rating / Smoke Barrier
20 MIN – 20 Minute Fire Rating
¼ HR – 45 Minute Fire rating
1 ½ HR – 90 Minute Fire Rating
2 HR – 120 Minute Fire Rating
3 HR – 180 Minute Fire Rating

Disclaimer

Weblinks:

Weblinks do change from time to time as manufacturers move around their websites, please inform us if you have a nonfunctioning weblink.

HARDWARE SCHEDULE



Heading# 1

Opening Information					
Opening Type:	Single	Opening Size:	1067 x 2134 x 57	STC Rating	None
Door Material:	IC-ALD	Frame Material:	ALF	Fire Rating	None

1 Total Openings							
1	Door#	122	Location:	Exterior	From	Vestibule	Handing: RHA

By Hardware Supplier					
3	Butt Hinge	CB191 – 127 x 102 x NRP	630 / US32D / Satin Stainless Steel	Best	
1	Power Supply	RPSMLR2BB	N/A	Best	
1	Power Transfer	EPT-12C	651 / US26 / Polished Chrome	Best	
1	Quick Connect Cable (PT to Exit Device)	WH-3	N/A	Best	
1	Quick Connect Cable (PT to Junction Box)	WH-192P	N/A	Best	
1	Latch Retraction Exit Device	C-MLR-TS-2603	630 / US32D / Satin Stainless Steel	Best	
1	Door Pull	CBH 6039 – 1 ¼" x #1 MTG x 1829mm (2 ¼" thick door)	630 / US32D / Satin Stainless Steel	CBH	
1	Overhead Stop	1024	630 / US32D / Satin Stainless Steel	ABH	
1	Threshold	CT-407 x 1067	719 Milled Aluminum	KN Crowder	
1	Weatherstrip	By Aluminum Door Supplier			
1	Door Sweep	By Aluminum Door Supplier			
By Automatic Operator Supplier					
1	Auto Operator	SW200i – 45" Header – Pull Arm	628 / US28 / Clear Anodized	Besam	
1	Square Push Plate Set	CM-RFL454-LPA	630 / US32D / Satin Stainless Steel	Camden	
1	Logic Relay	CX-33	N/A	Camden	
By Security Supplier					
1	Card Reader	To Suit Building System, By Security Supplier			
1	Door Contact	To Suit Building System, By Security Supplier			

1	Access Controller	To Suit Building System, By Security Supplier			
1	Rex Sensor	Provided in Exit Device, Security to Wire			
By Owner					
1	Permanent Cylinder	BEST SFIC - Provided by Owner			

Notes:

- 120VAC is required at the head of the door for all barrier free door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit with pull cords to back boxes for actuators, lights / sounders are to be provided by the electrical contractor. Electrical contractor to provide low voltage wires to actuator locations as required.
- Electrical contractor to confirm quantity of wires and wire locations with auto door operator supplier prior to pulling wires.
- GC to verify the required threshold depth on site based on actual site conditions and notify the consultant if an alternate threshold depth is required.

.....End of Heading.....

Miscellaneous Notes:

- Template all overhead stops to the maximum degree of opening and opening will allow.
- Awarded bidder to have a keying conference with owner.
- GC is to always to provide the cylinder body and supply colour coded keyed construction cores.
- GC to verify the required threshold depth on site based on actual site conditions and notify the consultant if an alternate threshold depth is required.

END OF SCHEDULE

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide Gypsum Board work including but not limited to following:
 - .1 Gypsum board ceilings, partitions, bulkheads and soffits;
 - .2 Ceiling, bulkhead and soffit suspension system;
 - .3 Corner beads, casing beads, trim, control joints and corner reinforcement;
 - .4 Steel studs and furring channels;
 - .5 Taping and filling;
 - .6 Fire rated wall assemblies;
 - .7 Installation of doors supplied by other trades in gypsum board walls and ceilings as required.

1.3 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 07 92 00 - Sealants;
- .3 Section 09 91 00 – Painting;
- .4 Supply of access doors – Division 21 to 28 incl.

1.4 REFERENCE STANDARDS

- .1 Definition: Drywall = Gypsum board
- .2 Interior metal framing and furring: comply with applicable requirements of ASTM C754-18 and ASTM C840-18 unless otherwise shown.
- .3 Gypsum board application and finishing: comply with requirements of ASTM C840-18, unless otherwise shown.
- .4 Gypsum board surfaces exposed to view shall meet Gypsum Association GA 214-10 Recommended Levels of Gypsum Board Finish “Level 4”.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate installation and cooperate with mechanical and electrical trades to accommodate mechanical electrical items and any other work required to be incorporated into or coordinated with ceiling and soffit systems.
 - .2 Cooperate and coordinate with Sections applying wet trades and trades installing mechanical and electrical services. Coordinate stud layout at partitions accommodating wall mounted fixtures by other trades.

1.6 SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit digital shop drawings showing design, construction, control joint layout, sound attenuating construction, adjacent construction, elevations, finishes and relevant details of furring, enclosures and partitions which require fire rating.
- .2 Samples:
 - .1 Provide 300 mm long samples of corner beads, edge trims and insulating strip.

1.7 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified.

1.8 FIRE PROTECTION REQUIREMENTS

- .1 Provide fire rated gypsum board components and assemblies as indicated.
- .2 Where firehose cabinets, electrical panels or other fixtures or equipment are recessed into fire rated gypsum board partitions, provide fire rated backing to maintain required fire rating.
- .3 Protect recessed fixtures in fire rated gypsum board ceilings in accordance with fire rated assembly design report and/or as indicated.
- .4 Gypsum bulkheads/partitions in ceiling spaces above fire rated glazed screens, doors or other elements shall have same fire rating as screens/doors over which they occur.
- .5 Fire rated bulkheads are required in first floor ceiling spaces where construction changes from fire rated floor assembly to non-fire rated roof assembly. Carefully examine Drawings to determine locations.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Delivery:
 - .1 Deliver materials to site with manufacturer's original labels intact. Do not remove wrappings until ready for use
- .2 Storage:
 - .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.
 - .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.

1.10 SITE CONDITIONS

- .1 Do not install 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 work of this Section does not exceed 55% for duration of Project
- .2 Ensure temperature of surrounding areas is min 13 deg C and max 21 deg C 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.
- .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**

- .1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - .1 Bailey Metal Products Ltd.; www.bmp-group.com
 - .2 CertainTeed Corporation; www.certainteed.com
 - .3 CGC Inc; www.cgcinc.com
 - .4 Chicago Metallic; www.chicagometallic.com
 - .5 Georgia-Pacific Canada, Inc.; www.gpgypsum.com
 - .6 Gordon Incorporated; www.gordongrid.com
 - .7 Roll Formed Specialty; www.rollformed.com
 - .8 Trim-Tex Inc.; www.trim-tex.com

2.2 FRAMING

- .1 Unless otherwise specified, provide framing members of minimum 0.5 mm core thickness steel hot dip galvanized (wipe coat) to ASTM A653.
- .2 Studs, interior locations: channel shaped screw-on type: depth as indicated; with knurled supporting flanges at least 34 mm wide; with service pass-through holes at 610 mm o.c. in web. Provide minimum 0.9 mm thick studs where stud depth exceeds 92 mm or where abuse resistant board is used.
- .3 Top and bottom runners: channel sections, 35 mm legs and service pass-through holes at 610 mm o.c. Depth to suit studs.
- .4 Rough framing members: 38 x 13 x 1.2 mm and 19 x 13 x 1.2 mm galvanized steel channels.
- .5 Furring and strapping members to receive gypsum board: 19 mm deep channel shaped section with outstanding flanges and 35 mm wide knurled supporting face.
- .6 Corner beads: beaded angle with perforated flanges.
- .7 Casing beads: channel shaped; beaded corners.
- .8 Hangers: minimum 3 mm galvanized steel wire.
- .9 Tie wire: minimum 1.5 mm soft annealed galvanized steel.
- .10 Metal control joint section: bellows shaped section with perforated flanges.
- .11 Reveal mouldings: extruded aluminum, profiles as indicated, by Fry, Pittcon or Gordon.

2.3 GYPSUM BOARD

- .1 Exposed gypsum board for interior use: tapered edge: ASTM C1396.
- .2 Unexposed gypsum board for interior use: backing board: ASTM C1396.
- .3 Fire rated gypsum board: Type 'X' board: ASTM C1396.
- .4 Abuse resistant gypsum board ASTM C1278: 16 mm thick, fire rated and non-fire rated: Fiberock VHI by CGC or equivalent product by CertainTeed.
- .5 Gypsum sheathing: DensGlas Gold by Georgia Pacific or GlasRoc by CertainTeed.
- .6 Backer board for ceramic tile: ASTM C1178-18: Dens Shield by Georgia Pacific, or Aqua Tough by CGC, or equivalent product by CertainTeed.
- .7 Water resistant gypsum board: glass fibre-reinforced, paperless face, moisture and mould resistant core, Type X where required: ASTM C1278/C1278M and Mold Resistance: ASTM D 3273.

2.4 CEMENTITIOUS BOARD

- .1 Board for paint finish:
 - .1 Board: polymer modified, fibreglass mesh reinforced lightweight concrete board, 12 mm thick, tapered edges: PermaBase by Unifix.
 - .2 Joint tape: 75 mm wide alkali resistant fibreglass mesh tape: Unitape by Unifix.
 - .3 Base coat reinforcing: Uniroll by Unifix.
 - .4 Joint compound and base coat: acrylic based: Acryjoint by Unifix.
- .2 Cement board for textured finish or backing for ceramic tile: Durock by CGC 16 mm thick, or equivalent product by other manufacturer approved by Consultant.

2.5 FASTENINGS AND FINISHING MATERIALS

- .1 Drywall screws: self-drilling, self-tapping, case hardened. Use zinc, nickel or cadmium plated screws for fastening of cementitious board.
- .2 Laminating adhesive: CGC Durabond 90 compound by CGC or similar by BPB.
- .3 Joint tape: 50 mm perforated type.
- .4 Joint filler and topping cement: casein, vinyl or latex base, slow setting: ASTM C475/C475M,.

2.6 ACOUSTICAL MATERIALS

- .1 Acoustic Insulation inside partitions and above ceilings: AFB by Roxul or equivalent product by Fibrex.
- .2 Caulking: to CAN/CGSB-19.21-M87: Acoustical Sealant by Tremco, or CGC Acoustical Sealant.
- .3 Steel deck closures: Emseal 25V Expanding Foam Sealant sized and shaped to fit flutes.

2.7 THERMAL BREAK

- .1 Adhesive face rubberized cork 3 mm thick or self adhesive closed cell neoprene sponge tape "Permastik" 122X by Jacobs and Thompson Ltd., or foamed vinyl tape "Arnofoam" by Arno Adhesive Tape Inc.

2.8 ACCESS PANELS

- .1 Supply and install access doors as required by Divisions 21 to 28. Build doors into gypsum board elements flush and parallel to walls/ ceilings and securely fastened.
- .2 Access Panels for Items Other Than Mechanical and Electrical: "N/W Series, Flush Non-Rated Access Panels" by Nystrom Building Products; www.nystrom.com or "DW-5040" by Acudor Products Inc.; www.acudoracornltd.com, sized to suit requirements of other Sections, but minimum size 406 mm x 406 mm (16" x 16") with drywall bead frame and key operated cylinder lock.

PART 3 – EXECUTION**3.1 EXAMINATION**

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

3.2 METAL FRAMING

- .1 General:
 - .1 Framing and furring indicated is schematic and shall not be considered exact or complete. Location and spacing of members, bracing, supports and securement shall be in accord with referenced standards as required to provide complete and finished work.
 - .2 Make provision for supporting recessed and surface mounted fixtures and equipment. Provide additional framing, supports and stiffeners as required.
 - .3 Neatly frame around recessed fixtures and openings
 - .4 Examine mechanical and electrical drawings and coordinate with Divisions to determine openings required.
- .2 Partitions:
 - .1 Unless specified or shown otherwise, extend steel studs to underside of structural slab above.
 - .2 All steel studs shall be spaced at 400 mm maximum, except where indicated otherwise. At curved walls/partitions space studs closer so as to maintain uniform curvature.
 - .3 Install runner channels at top and bottom of partition and secure to supporting building elements at maximum 610 mm o.c..
 - .4 At partition corners extend one runner channel to end of corner and butt other runner channel; allow clearance for gypsum board thickness; do not mitre runner channels.
 - .5 Install steel studs vertically; fix studs to runner channels by crimping or screwing on both sides of stud.
 - .6 Install additional studs as detailed and required at partition intersections, openings and terminations at dissimilar materials. Place studs not more than 50 mm from abutting walls, openings and each side of corners.
 - .7 Stiffen partitions over 2400 mm in height at maximum 1500 mm with at least one 19 mm horizontal bracing channel extending full length of partition.

- .8 Stiffen partitions over 2400 mm in height at maximum 1500 mm with at least one 19 mm horizontal bracing channel extending full length of partition.
- .3 Ceilings and Soffits:
 - .1 Erect suspension and furring system level with a maximum tolerance of +3 mm over a 3000mm length.
 - .2 Suspension system shall support ceiling assemblies, with maximum deflection of L/360, L being span between supports.
 - .3 Hangers for suspended ceilings shall support grillage independent of walls, columns, pipe and ducts. Space hangers at maximum 1220 mm o.c. along rough furring members and not more than 150 mm from ends. Do not place hangers in front of access panels.
 - .4 Space rough furring members at maximum 915 mm and not more than 150 mm from perimeter walls.
 - .5 Space furring channels transverse to runner channels at maximum 610 mm o.c. except at exterior soffits, and secure to each support with clip or saddle tie with 2 loops of tie wire. Install furring channels so as not to contact perimeter walls.
 - .6 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.
 - .7 At exterior soffits suspend soffit framing with metal studs and brace system to withstand positive and negative wind pressures without detrimental effects. Fasten furring members to surrounding walls. Space primary furring channels at max. 610 mm o.c. Provide Z-shaped furring members at max. 400 mm o.c. Use minimum 1.2 mm thick framing members.
- .4 Bulkheads, Covers, Furring:
 - .1 Frame to profiles shown, rigid, square, true to line and securely fastened to supporting building elements.
 - .2 Space furring members to receive gypsum board at maximum 610 mm o.c.
 - .3 Provide rough framing and bracing members as required to ensure stability and accuracy of work.
 - .4 Where indicated, provide resilient furring channels, spaced at maximum 600 mm o.c.

3.3 GYPSUM BOARD INSTALLATION

- .1 Unless otherwise specified, erect gypsum board vertically or horizontally, whichever results in fewer end joints.
- .2 Locate board end joints over supporting members.

- .3 Cut and fit gypsum board as required to accommodate other work.
- .4 Unless otherwise shown or specified, extend gypsum board on both sides of partitions to underside of structural deck above. Fasten gypsum board to studs, not to top channel. Allow for 13 mm deflection.
- .5 Do not install gypsum board until wood blocking or other back-up components are installed. Remove and reinstall gypsum board at no extra cost to Contract where this requirements is not complied with..
- .6 Provide corner beads at external corners.
- .7 Provide casing beads around openings and where gypsum board abuts dissimilar material and construction.
- .8 Fasten gypsum board to supports with screws spaced at maximum 305 mm o.c..
- .9 Install gypsum sheathing horizontally at outside of exterior wall steel studs. Fasten each board at each stud with minimum 3 screws.
- .10 Adhesive bonded gypsum board; apply 13 x 13 mm ribbons of laminating adhesive to back side of board, parallel to long dimension; space adhesive ribbons at max.150 mm o.c. temporarily brace boards until complete adhesive bond develops.
- .11 Where double layer is required screw fasten second layer through first into steel framing. Select screws of suitable length to ensure positive fastening. Offset joints in second layer.

3.4 GYPSUM BOARD FINISHING

- .1 Tape and fill exposed joints, fastener heads, edges, corners, to produce an acceptable surface ready for decoration.
- .2 Conceal exposed flanges of corner beads, casing beads and other trim sections with at least 3 coats of cement, feathered out minimum 200 mm.
- .3 Fill depressions at fastener head with cement, then apply 2 additional coats of cement to produce smooth, level surface.
- .4 Treat joints using 3 coat method as follows:
 - .1 Apply thin uniform layer of cement and embed joint tape.
 - .2 Immediately apply thin skim coat of cement over tape and allow to dry.
 - .3 Apply 2 additional coats of cement. Allow first coat to dry before applying second coat.
- .5 Sand each coat of topping cement with fine sandpaper as required to produce smooth surface. Do not sand paper face of gypsum board.
- .6 Finish concealed fastener heads at fire rated gypsum board elements in manner specified for exposed work.

- .7 Finish concealed joints at fire rated and at acoustically insulated gypsum board elements in manner specified for exposed work..

3.5 CONTROL AND RELIEF JOINTS

- .1 Control Joint:
 - .1 Provide control joints where shown and at maximum 10 m o.c.
 - .2 Break continuity of gypsum board and framing system at control joints; install continuous metal control joint section.
- .2 Relief Joints:
 - .1 Provide relief joints where shown and where gypsum board assemblies abut dissimilar construction.
 - .2 Stop gypsum board 6 mm from abutting construction at dissimilar building elements, unless otherwise indicated.
 - .3 Where gypsum board comes into contact with window frames or exterior door/screen frames install thermal break. Adhere self-sticking tape to casing bead and compress during installation of gypsum board.
 - .4 Where indicated, install reveal mouldings. Provide reveal moulding where ceilings meet curved wall surface.

3.6 SOUND CONTROL

- .1 Partitions:
 - .1 Provide acoustical insulation in gypsum board partitions as indicated. Unless otherwise noted provide 50 mm thick insulation. Extend acoustical insulation over full height of partition, including portions located above ceiling.
 - .2 Provide acoustical caulking at all partitions scheduled to receive acoustical insulation as follows:
 - .1 At perimeter of partitions.
 - .2 Around objects penetrating partition.
 - .3 Provide 2 bead caulking system around horizontal and vertical perimeters. Apply continuous sealant beads at each side of horizontal runner tracks and vertical end studs, between gypsum board and adjacent construction.
 - .4 Caulk around objects such as electrical outlets, light switches, electrical and mechanical panels and boxes, grilles, and other objects penetrating. Caulk behind metal control joint sections.

- .5 Where acoustically insulated partitions meet steel deck running perpendicularly to partition, provide steel deck closures.

3.7 DOOR FRAMES / ACCESS DOORS

- .1 Install access doors when required by Mechanical and Electrical equipment. Build doors into gypsum board elements flush and parallel to walls and securely fastened.

3.8 SITE QUALITY CONTROL

- .1 Replace damaged work which cannot be satisfactorily repaired to satisfaction to Consultant at no cost to Owner.

3.9 CLEANING

- .1 Clean off beads, casings, joint cement droppings and similar items and remove surplus materials and rubbish on completion and as directed

3.10 SCHEDULE OF FINISHES

- .1 Use Type 'X' gypsum board at fire rated elements.
- .2 Use exterior gypsum sheathing at outside of exterior wall steel studs.
- .3 Use abuse resistant gypsum board where indicated.
- .4 Use water proof gypsum board in wet areas.
- .5 Unless otherwise specified or shown, provide 16 mm thick standard gypsum board.
- .6 Repair existing surfaces where work is scheduled and/or where existing finish is damaged by alteration work.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide Ceramic and Porcelain tile work including but not limited to following:
 - .1 Floor tile, base and fittings;
 - .2 Wall tile;
 - .3 Waterproofing membrane;
 - .4 Mortar;
 - .5 Stain resistant floor grout;
 - .6 Caulking tile control joints;
 - .7 Caulking penetrations through wall and floor tile.

1.2 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 07 92 00 – Sealants;

1.3 SUBMITTALS

- .1 Shop Drawings:
 - .1 Submit digital shop drawing list of mortar mixes, waterproof membrane and grout to be utilized.
 - .2 If requested by the consultant, submit digital shop drawing of tile joint layout.
 - .3 If requested by the consultant, provide a floor and/or wall tile mock up on site at location as directed by the consultant. Once approved, it will serve as a quality reference standard for the balance of the project.
- .2 Samples: Submit two 300mm x 300mm samples of each type of tile and grout specified.
- .3 Close Out Documents:
 - .1 Submit manufacturer's recommended maintenance procedures and materials for inclusion into

operation and maintenance manuals.

- .2 Provide Owner with one sealed carton of each type tile used. Clearly identify each package and store where directed. Obtain receipt and submit copy to Consultant.

1.4 QUALITY ASSURANCE

- .1 Provide work of this Section executed by competent installers who is a member in good standing with TTMAC and has a minimum of 5 years 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.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Delivery:
 - .1 Coordinate deliveries to comply with construction progress schedule and arrange for above ground, under cover storage location with Owner before materials are delivered to site.
 - .2 Deliver tile in a manner to avoid chipping, breakage, staining and any other damage.
 - .3 Deliver packaged materials in their original bags and containers clearly identified.
- .2 Storage:
 - .1 Store and handle tile in a manner to avoid chipping, breakage, staining and any other damage.
 - .2 Store packaged materials in their original bags and containers clearly identified. Keep containers sealed and labels intact unit 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.
 - .3 Provide secure heated and dry storage facilities on site. Maintain temperatures in storage area between 15 deg C and 30 deg C.

1.7 SITE CONDITIONS

- .1 Do not perform work of this Section at temperature below 12 deg C when using portland cement mortars or dry set mortars, latex portland mortars or bond coat. Maintain temperature between 12 deg C and 32 deg C.
- .2 Observe manufacturer's recommended working temperatures for installation of adhesives and grouts.
- .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
- .4 Do not perform work of this Section when either substrate and/or ambient temperatures are below 10 deg C or above 35 deg C. 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.

1.8 WARRANTY

- .1 Warrant 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.
- .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**

- .1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - .1 Centura; www.centura.ca
 - .2 Daltile Inc.; www.daltile.com
 - .3 Flextile Ltd.; www.flextile.net
 - .4 Laticrete International, Inc.; www.laticrete.com
 - .5 Mapei Corporation; www.mapei.ca
 - .6 Olympia Tile International Inc.; www.olympiatile.com
- .2 Use proprietary Products in full compliance with manufacturer's recommendations. As far as possible obtain Product from single manufacturer ensuring compatibility with adjacent components while maintaining quality.

2.2 MATERIALS

- .1 Porcelain Floor tile (PCT):
 - .1 New PCT floor and base to match existing floor. Refer to drawings for locations. Contractor to notify Consultant if matching tile is not available.
- .2 Products by Laticrete listed herein are specified to establish a standard of acceptance. Equivalent products, subject to Consultant's review, by Mapei is also acceptable.
- .3 Water: clean and non-staining.
- .4 Portland cement: CSA A3000-18.
- .5 Sand: CSA A82.56-M1976.
- .6 Waterproof membrane: single component liquid rubber polymer: Laticrete Hydro Ban.

- .7 Reinforcing: 50 x 50 x 1.6 mm hot dip galvanized steel wire mesh.
- .8 Thick bed mortar: high strength latex-portland cement mix: Laticrete 226/3701/8510.
- .9 Thin set mortar: latex-portland cement mix: Laticrete 211/4237.
- .10 High strength mortar: 100% solids epoxy adhesive: Latapoxy 300.
- .11 Organic adhesive: latex adhesive to ANSI A136.1: Laticrete 15 Multi-Mastic.
- .12 Floor grout: epoxy grout: Spectral Lock Pro Grout by Laticrete; colours selected by Consultant.
- .13 Wall grout: unsanded dry set, coloured: Laticrete 600 Series/1776; colours selected by Consultant.
- .14 Control joints: Schlüter DILEX-BWB, height to suit tile thickness, colour selected by Consultant.
- .15 Transition trim: stainless steel profile: Schlüter Reno-U, height to suit.
- .16 Wall finish edge protection at all corners: stainless steel profile: Schluter Rondec, full height of tile.
- .17 Cleaning compound: TTMAC 1001
- .18 Transition strip between PCT and VCT; Schluter, Shiene Stainless

2.3 MIXES

- .1 Mortar and grout: mix using suitable mechanical mixers in accordance with material manufacturer's directions.
- .2 Place liquid into mixer, start mixer and add dry material. Mix only long enough to wet out batch; do not overmix. Dump mixed material from mixer promptly and clean out mixer with water after each batch.

PART 3 – EXECUTION

3.1 EXAMINATION

- .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.
- .2 Ensure compatibility of adhesives, waterproofing, reinforcing and fillers with adjacent substrate and component coming in contact with these Products.
- .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.
- .4 Preinstallation 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 Consultant prior to commencement of installation.

- .5 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 this Subcontractor replaces at his own expense, sub-standard and/or pre-damaged tiles once installed.
- .6 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 Work area.
- .7 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.
- .8 Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- .1 Provide tiling in accordance with TTMAC's current "Specification Guide 09 30 00 Tile Installation Manual" unless specified otherwise.
- .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. Provide uniform joint widths throughout.
- .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.
- .4 Arrange accessories in tile work so they are spaced evenly, centered with joints and set true with proper and adequate projection conforming to manufacturer's recommendations.
- .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 backbuttering or other approved technique.
- .6 Fit tile units around corners, fitments, 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.
- .7 Grout colour of tile to be selected by Consultant to match existing. Fill joints.
- .8 Porcelain Tile:
 - .1 Bond porcelain tile to all substrates with high strength mortar. Bond other tile to substrate in accordance with mortar / adhesive manufacturer's directions and as follows:

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- .1 All locations except where indicated otherwise: thin set mortar.
 - .2 Gypsum board substrate: organic adhesive.
 - .3 Cement board substrate: high strength mortar.
 - .3 Finished work shall be level, plumb, or sloped as shown, true, square and free of defective, chipped, broken, discoloured or blemished tiles. Maximum allowable finished surface variation shall be 3 mm in 3 m when measured, in any direction, with a 3 m straight edge.
 - .4 Lay out tile patterns symmetrically within each area and to patterns shown. Unless otherwise indicated or directed provide stacked pattern.
 - .5 Joints shall be parallel, uniform, neat, straight, square and completely filled. Provide joint width as directed by Consultant.
 - .6 Fit tile accurately against and around interruptions, penetrations and abutting dissimilar surfaces. Wherever possible, drill holes for penetrating elements to ensure neat fitting.
 - .7 Provide accent patterns as shown, or if not shown, as directed by Consultant.
 - .8 Provide tile manufacturer's standard trim pieces at changes in direction and at terminations. Unless otherwise indicated provide the following corner and edge conditions:
 - .1 Internal horizontal corners: coved.
 - .2 External vertical and horizontal corners and edges: 100mm deep bull nosed
 - .8 Expansion and Control Joints:
 - .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.
 - .2 Install control joints where tiling abuts restraining surfaces, around perimeter of work (and or panel) and at base of columns and curbs.
 - .3 Install and space expansion and control joints in accordance with following:
 - .1 Interior: 4878 mm to 6098 mm in each direction with minimum joint width of 6 mm.
 - .2 Interior exposed to direct sunlight or moisture: 2439 mm to 3659 mm in each direction with minimum joint width of 6 mm.
 - .3 Exterior - normal: 2439 mm to 3659 mm in each direction with minimum joint width of 9 mm.
 - .4 Exterior - excessive: 2439 mm to 3049 mm in each direction with minimum joint width of 13 mm.
 - .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.

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- .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
 - .9 Waterproof membrane:
 - .1 At all locations with floor drains and where indicated at other areas, provide waterproofing membrane below/behind ceramic tile. Follow manufacturer's directions for surface preparation, installation and protection.
 - .2 Pre-treat cracks, joints, coves, floor/wall transitions and drain flanges with a liberal coat of waterproofing, in accordance with membrane manufacturer's directions.
 - .3 Carry waterproofing membrane up and over curbs and up surrounding walls, minimum 150 mm high, but in no case shall membrane be visible in finished work.
 - .4 Apply membrane liberally, minimum 0.508 mm (20 mils) dry film. Allow 5 Day cure time. Protect installed membrane from contact with water for at least 2 hours after final cure (21 °C and 50% RH).
 - .5 Conduct hydrostatic water pressure test minimum 24 hours. No water loss allowed, except due to evaporation.
 - .6 Repair and retest if required.
 - .7 Provide minimum 1.6 mm (1/16") levelling bed to surfaces to receive waterproof membrane, in accordance with manufacturer's instructions.
 - .8 Provide ramped levelling bed beneath finish flooring adjacent to ceramic tile, for minimum 600 mm strip, to achieve flush finished surfaces at finished flooring transition.
 - .10 Grouting:
 - .1 Where tiling or stone tiling is installed with normal setting thin-set mortar, grout no sooner than 24 hours after installation.
 - .2 Where tiling or stone tiling is installed with fast-setting mortar system, grout no sooner than 3 to 4 hours after installation.
 - .3 Where tiling or stone tiling is installed with reactive epoxy mortars and adhesives, grout no sooner than 24 hours after installation.
 - .4 Where tiling or stone tiling is installed with reactive polyurethane adhesive, grout no sooner than 24 hours after installation.
 - .5 Install epoxy grouts in accordance with Product instructions and ANSI A108.6.
 - .6 Install chemical resistant furan resin mortar and grout only for setting and grouting pre-waxed chemical resistant floor tile or paving brick. Proceed in accordance with Product instructions and ANSI A108.8.
 - .7 Install unsanded cement grout in accordance with Product instructions and ANSI A108.10.
 - .8 Install sanded cement grout in accordance with Product instructions and ANSI A108.10.

- .9 Install fast-setting sanded 'HCT' cement grout in accordance with Product instructions and ANSI A108.10

3.8 SITE QUALITY CONTROL

- .1 Replace damaged work which cannot be satisfactorily repaired to satisfaction to Consultant at no cost to Owner.
- .2 Have manufacturer's representative visit site at commencement of tile work to give proper direction and thereafter at regular interval to ensure proper workmanship.

3.9 CLEANING

- .1 Remove grout and mortar residue immediately while work progresses and before materials harden on tiling surface.
- .2 Clean tiling completely leaving no apparent cement laitance on the surface. Do not acid wash especially where pigmented grouts are specified.
- .3 Clean adjacent surfaces that have been soiled or otherwise marred, to completely remove evidence of materials causing same.
- .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.

3.10 PROTECTION

- .1 Protect other parts of work from spatters, stains or damage.
- .2 Remove and replace with new materials, sections of work that have become stained, soiled, broken, chipped or otherwise damaged.
- .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.
- .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.
- .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.
- .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.
- .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%.

- .8 Protect finished work from damage by other trades and general abuse until Substantial Performance of the Work and acceptance

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide Acoustic Panel Ceilings work including but not limited to following:
 - .1 Ceiling suspension systems;
 - .2 Lay-in acoustic ceiling panels;

1.2 RELATED SECTIONS

- .1 Section 01 35 16 - Alteration Procedures;
- .2 Section 09 21 16 – Gypsum Board;

1.3 REFERENCES

- .1 ASTM C635/C635M-12 - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- .2 ASTM C636/C636M-08 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
- .3 CAN/CGSB-92.1-M89 - Sound Absorptive Prefabricated Acoustical Units
- .4 CAN/ULC-S101-07 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
- .5 CAN/ULC-S102-07 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .6 CAN/ULC-S114-05 - Standard Method of Test for Determination of Non-Combustibility in Building Materials
- .7 CAN/ULC-S702-09 - Standard for Mineral Fibre Thermal Insulation for Buildings

1.4 SUBMITTALS

- .1 If requested by the Consultant, submit statement from suspension system manufacturer verifying that suspension system will support light fixtures within deflection criteria contained in referenced standards.

- .2 Samples: submit two samples of each type of acoustical panel specified; size: 300 mm x 300 mm. Upon Consultant's request submit samples of suspension system components.
- .3 Maintenance materials: provide Owner with two sealed cartons of each type panel used. Obtain receipt and submit copy to Consultant.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Delivery:
 - .1 Deliver materials in original packages, containers and bundles, bearing brand and manufacturer's name and ULC or cUL labels.
- .2 Storage:
 - .1 Store materials in a covered area, off ground, on flat, smooth, dry surfaces. Protect from moisture. Remove damaged or deteriorated materials from site.

1.7 SITE CONDITIONS

- .1 Continuously maintain rooms or areas scheduled to receive acoustical treatment at not less than 21 deg C 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.
- .2 Ensure that work to be concealed by ceiling systems has been installed, tested, inspected and approved before starting work.
- .3 Co-ordinate with Mechanical and Elecatrical divisions for work to be built into work of this Section.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- .1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
 - .1 Armstrong World Industries Canada Ltd.; www.armstrong.com
 - .2 CGC Inc.; www.cgcinc.com

2.2 MATERIALS

- .1 Acoustic Panels (ACT): 610mm x 1220mm x 16 mm thick or 610mm x 610mm x 16mm thick, square edged mineral fibre board, colour: white: Armstrong Georgian 763D or equivalent by CGC. New tiles to match existing.
- .2 Suspension system: Prelude XL 8300 fire rated grid system: Georgian by Armstrong or equivalent by CGC.
 - .1 Main tees: 38 mm high bulb section, minimum 0.4 mm thick cold rolled galvanized steel. Main tee members shall be 3660 mm long.
 - .2 Cross tees: minimum 0.4 mm thick cold rolled galvanized steel; profile designed to limit deflection to 1/360 of span; designed to have suitable detail to rest on, automatically engage, level and lock to main tee.
 - .3 Wall moulding: prefinished exposed face galvanized steel angle.
 - .4 Hangers: minimum 2.5 mm (No. 12 SWG) galvanized steel wire.
 - .5 Carrying channels: minimum 1.2 mm thick cold rolled galvanized steel channels 38 x 13 mm.
 - .6 Finish for exposed metal surfaces: satin enamel, colour matching acoustic panels.
- .3 Accessories: splicers and fasteners, as required to provide complete and finished work; manufacturer's standard types.
- .4 Seismic securement clip: ACMT by CGC or equivalent product by other manufacturers listed.

PART 3 – EXECUTION**3.1 EXAMINATION**

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

3.2 INSTALLATION

- .1 Lay out ceilings in accordance with reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown install ceilings as directed by Consultant.
- .2 Finished work shall be plumb, level and square with adjoining work.
- .3 Suspend ceilings directly from structural members or from carrying channels supported from structural members. Do not fasten hangers to ducts, pipes, conduits.

- .4 Erect suspension systems level with a maximum tolerance of 3 mm over 3 m length.
- .5 Install main tees in accord with module size. Suspend at maximum 1220 mm o.c.
- .6 Install cross tees perpendicular to main tees in accord with module size. Interlock with main tees.
- .7 Hangers for suspended ceilings shall support grillage independently of walls, columns, pipes and ducts. Space hangers at maximum 1220 mm o.c. along supporting grillage and not more than 150 mm from ends. Do not place hangers in front of access panels.
- .8 Make provisions for carrying fixtures occurring on and in suspended ceilings. Install additional hangers and reinforcing to ensure that loads being carried do not compromise integrity of system. Frame around fixtures and openings as required.
- .9 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.
- .10 Exposed members shall be as long in length as practical to minimize joints. Distribute joints to prevent clustering in one area. Joints shall be made square, tight and flush so that exposed faces of intersecting members are on same plane.
- .11 Joints in suspension system members shall be reinforced with splines or other suitable methods.
- .12 Install perimeter moulding at abutting vertical surfaces.
- .13 Where work of other Sections is fastened to acoustical ceilings, reinforce suspension system and/ or acoustical panels in manner acceptable to Consultant.
- .14 Install panels so that work is clean and unmarked.
- .15 Neatly cut and fit panels as required to suit ceiling layout and to accommodate other work.
- .16 Recessed items shall replace or be centred on panel unless otherwise indicated.

3.8 SITE QUALITY CONTROL

- .1 Replace damaged work which cannot be satisfactorily repaired to satisfaction to Consultant at no cost to Owner.
- .2 Existing ceiling tiles damaged due to the work to be replaced with matching tiles at no cost to Owner.

3.9 CLEANING

- .1 Clean exposed surfaces of acoustical panel ceilings, including trim and edge mouldings. Comply with manufacturer's written instructions for cleaning and touch-up of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned or repaired to permanently eliminate evidence of damage.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 RELATED WORK

- .1 Section 09 21 16 – Gypsum Board;
- .2 Divisions 21 to 28 - Colour coding of concealed mechanical and electrical services

1.3 ACCEPTABLE MANUFACTURERS

- .1 Unless otherwise specified, materials shall be manufactured and supplied by one of the following:
 - .1 Benjamin-Moore
 - .2 Dulux Paints
 - .3 Para Paints
 - .4 Pittsburgh Paints
 - .5 Pratt & Lambert
 - .6 Sherwin-Williams
 - .7 PPG Corafon

1.4 LIST OF MATERIALS, SAMPLES

- .1 List of Materials:
 - .1 Before ordering materials, submit written request in form acceptable to Consultant, for approval of paint materials. List each of the materials proposed and surfaces to be covered. State manufacturer's name and brand name of materials.
 - .2 List of materials shall be endorsed by manufacturer as being the best material for the applicable condition.
 - .3 Do not order material or commence work until list of materials is approved by Consultant.
- .2 Samples:
 - .1 Submit two 200 mm x 250 mm colour draw-downs of each paint colour coated with manufacturer's paint system to confirm colour match with colour chips supplied by Consultant.
 - .2 Submit sample of natural and stained finishes on each species and grade of wood to receive such finishes.
 - .3 Prepare full size samples showing each type of door finish.

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- .4 Prepare sample panels of wall and ceiling paint system as directed by Consultant.
 - .3 Maintenance Materials:
 - .1 Upon completion of work provide one sealed and properly identified 1 gallon can of each type and colour paint used on this project.
 - .2 Only top coating paints used in building interior are required.
 - .3 Submit complete colour schedule listing paint colours, name and product code numbers, prior to Substantial performance.

1.5 PRODUCT HANDLING

- .1 Deliver paint materials to site in sealed original labelled containers bearing manufacturer's name, brand name, type of paint and colour designation.
- .2 Store materials in strict accordance with manufacturer's recommendations.
- .3 Do not store paints, stains, varnishes, rags, or equipment inside building. maintain separate workshop/storage shed for duration of work by this Section.

1.6 JOB CONDITIONS

- .1 Environmental Conditions:
 - .1 Maintain temperature to receive coatings between 15°C and 25°C for at least 24 hours before, during application and until coatings have cured after application.
 - .2 Adequately ventilate areas where coatings are being applied. Maintain a reasonably dust-free atmosphere for duration of work.
- .2 Protection:
 - .1 Protect adjacent surfaces not scheduled to receive coatings from damage.
 - .2 Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations. These items shall be carefully stored, cleaned and replaced on completion of work in each area. No solvent shall be used to clean hardware that will remove permanent lacquer finish on these items.
 - .3 Mask labels and specification plates occurring on equipment to be painted.
 - .4 Post "wet coating" signs while work is in progress and while coatings are curing.
- .3 Work Schedule:
 - .1 Unless otherwise permitted, apply coatings only after all other Sections have completed their work.

- .2 Coordinate work of this Section with that of Section 07 92 00 and review order of installation with Consultant where sealants are installed adjacent to painted surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Materials shall be "top line quality" products and shall be supplied by a single manufacturer except for specialty products not available from paint manufacturer.
- .2 Provide paints with zero VOC content.
- .3 Paints shall be factory mixed unless otherwise specified, except any coating in paste or powder form, or to be field-catalyzed shall be field-mixed in accordance with manufacturer's directions.
- .4 Primers shall be as specified by manufacturer and fully compatible with finish coats.
- .5 Stains shall be of the rapid dry, alkyd base type or pigment oil type.
- .6 Varnishes shall be synthetic type.
- .7 Shellac shall be pure white gum in pure grain alcohol.
- .8 Thinners, cleaners: as recommended by paint manufacturer.

2.2 FINISHES

- .1 Paint colours: to match existing
- .2 Confirm gloss levels for all surfaces with Consultant before starting work. Unless otherwise indicated, allow for the following:
 - .1 Ceilings: flat
 - .2 Walls: eggshell
 - .3 Trim, doors, frames: semi-gloss
 - .4 All other surfaces: semi-gloss
- .3 In existing buildings, confirm existing gloss levels for all repainted surfaces and match accordingly.

PART 3 - EXECUTION

3.1 CONDITIONS OF SUBSTRATES

- .1 Sound, non-dusting, and free of grease, oil, dirt, and other matter detrimental to adhesion and appearance of coatings.
- .2 Temperature: minimum 13°C.
- .3 Moisture content: maximum 12%. Test for moisture content using moisture meter.

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- .4 Alkalinity: test cementitious substrates for alkalinity. Use method recommended by coating manufacturer.

3.2 PREPARATION OF SUBSTRATES

- .1 All substrates: clean as required to produce an acceptable surface. If wood, metal or any other surface to be finished cannot be put in proper condition for finishing by cleaning, sanding and filling as specified, notify Consultant in writing or assume responsibility for an rectify any unsatisfactory finish resulting.
- .2 Galvanized steel: coat with etching cleaner and rinse (MPI #25)
- .3 Unit masonry and concrete: fill minor cracks, holes and fissures with non-shrink filler and smooth to a flush surface. Texture filled areas to match surrounding surface.
- .4 Gypsum board: fill minor cracks, holes and imperfections with patching plaster; allow to dry and sand smooth; sand taped joints and remove dust.
- .5 Alkaline surfaces: wash and neutralize using proper type of solution compatible with paint to be used.

3.3 APPLICATION OF COATINGS

- .1 Apply paint by brush or roller, except on wood and metal surfaces where paint shall be applied by brush only.
- .2 Spray painting may be permitted where deemed advantageous and shall be subject to Consultant's approval. When spray painting is permitted, use only airless spray guns. Consultant may prohibit use of spray painting at any time for such reasons as carelessness, poor masking or protective measures, drifting paint fog, disturbance to other trades or failure to obtain a uniform satisfactory finish.
- .3 Applied and cured coatings shall be uniform in thickness, sheen, colour and texture and free of brush or roller marks, sags, crawls and other defects detrimental to appearance and performance.
- .4 Regardless of the number of coats specified for any surface, apply sufficient paint to completely cover and hide substrate and to produce a solid uniform appearance.
- .5 Thoroughly mix materials before application. Use same brand of paint for primer, intermediate and finish coats.
- .6 Where two or more coats of same paint are to be applied, undercoats shall be tinted in lighter shades of final coat to differentiate from final coat.
- .7 Touch up suction spots after application of first coat. Sand lightly between coats with fine sandpaper.
- .8 Each coat of finish shall be dry and hard before succeeding coats are applied with a minimum of 24 hours between coats, unless manufacturer's instructions state otherwise. Do not proceed with any coat until the last preceding coat is approved by the Consultant.

3.4 PATCHING/TOUCH-UP

- .1 Prior to takeover of project by Owner, inspect work of this Section and touch-up or refinish damaged finishes and finishes unsatisfactory to Consultant

3.5 SCHEDULE OF FINISHES

- .1 General Requirements:
 - .1 Paint exposed surfaces of building materials, services and equipment, except those which are prefinished in factory and except those which are located in areas designed as not requiring painting.
 - .2 Comply with the following requirements except in areas designated as not requiring painting.
 - .1 Paint behind surface mounted fixtures on walls and ceilings with full coats of paint.
 - .2 Paint walls behind wall mounted heating units with full coats of paint.
 - .3 Paint inside surfaces of light coves white.
 - .4 Finish tops of doors, trim, projections and other work as specified for surrounding work whether above site lines or not.
 - .5 Finish edges of doors to match face of door. Refinish edges of doors after fitting.
 - .6 Finish drawers on all sides, inside and outside. Unless otherwise indicated finish drawers with two coats of varnish.
 - .7 Paint tops, bottoms and edges of shelves with full specified coats, whether exposed to view or not.
 - .8 Paint interior of ducts at grilles and diffusers with two coats of flat black paint, so that duct interior is not visible when grilles and diffusers are installed.
 - .9 Paint exposed piping, ducts and conduits in colours matching background wall or ceiling colours, unless otherwise directed by the Consultant. Ducts in mechanical rooms require only one finish coat in addition to primer. Other exposed ductwork to receive two finish coats.
 - .3 Where finishing formula for surfaces requiring painting is not included hereunder, follow recommendations of MPI Architectural Painting Specification Manual, latest issue.

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- .2 Interior Finishing:
- .1 Concrete and concrete block:
2 coats block filler
1 coat primer, latex or PVA based
2 coats acrylic latex
 - .2 Metal, prime painted:
Spot prime with alkyd metal primer
2 coats acrylic latex
 - .3 Metal, zinc coated:
1 coat galvanized primer
2 coats acrylic latex
 - .4 Woodwork, painted:
1 coat water based enamel undercoat
2 coats acrylic latex
 - .5 Woodwork, stained and varnished (transparent finish):
1 coat stain
1 coat sanding sealer, sand lightly
1 coat waterbased polyurethane varnish, gloss
1 coat waterbased or polyurethane varnish, satin
 - .6 Gypsum board:
1 coat drywall primer
2 coats acrylic latex
 - .7 Cementitious wood fibre acoustic panels:
2 coat alkali resistant latex
 - .8 Exposed piping, wrapped:
1 coat block filler
2 coats acrylic latex
 - .9 Exposed piping and conduit, unwrapped:
1 coat latex metal primer
2 coats acrylic latex
 - .10 Exposed ductwork, insulated:
1 coat block filler and primer
2 coats acrylic latex
 - .11 Existing Metal Radiators
Electrostatic Finish (off Site)
Colour to match wall

- .3 Exterior Finishing:
 - .1 Metal, zinc coated (hot dip galvanized):
 - 1 coat epoxy primer
 - 2 coats aliphatic polyurethane
 - .2 Metal, zinc coated (inorganic zinc rich primer):
 - 1 coat epoxy primer
 - 2 coats aliphatic polyurethane
 - .3 Wood:
 - 3 coats solid colour stain

3.6 EXISTING SURFACES

- .1 Repaint existing surfaces where they are scheduled to be painted or where finish is damaged by alteration work. Extend new paint finish over full height and/or width of area affected, to a straight line in location determined by Consultant.
- .2 All existing surfaces to be repainted shall receive as many coats of new paint, as required to hide existing finish.
- .3 Materials used for repainting shall be of similar quality to those specified for new work, but in each case shall be compatible with finishes to which they are applied.
- .4 Where compatibility of new coating with existing surface is uncertain, apply test patch of approximately 0.5 m² and check for results.
- .5 Prepare existing surfaces to be repainted as follows:
 - .1 Clean as required to remove dirt, dust, oil, grease, loose paint, rust and any other foreign matter which would prevent proper bonding of new finish.
 - .2 Peeled chipped, scratched and otherwise damaged surfaces shall be filled, sanded and repaired as required to provide consistent surface with texture matching that of adjacent area.
 - .3 Sand glossy surfaces to uniform dull texture.
 - .4 Treat bare areas as specified for new work.
- .6 Prior to repainting existing surfaces request Consultant's review and acceptance of prepared substrates, existing surfaces repainted without Consultant's review and acceptance may have to be prepared again as directed by Consultant and repainted at no extra cost.

END OF SECTION

PART 1 – GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Read and conform to:
 - .1 CCDC 2, Stipulated Price Contract as amended in the Contract Documents.
 - .2 Division 1 requirements and documents referred to therein.

1.2 SUMMARY

- .1 Section Includes: Provide exterior door sill protectors.

1.3 RELATED SECTIONS

- .1 Section 08 41 13 – Aluminum Doors;
- .2 Section 08 71 00 – Hardware.

1.4 SUBMITTALS

- .1 Submit brochures of equipment clearly showing model number, dimensions, tolerances, all installation accessories and fasteners.
- .2 Submit detailed shop drawings for the control panels complete with coordination of mechanical and electrical devices scheduled to be installed in the unit.
- .3 Upon Consultant's request, submit samples of all units complete with fastenings, for approval by Consultant and do not supply units to site until approval is obtained.

PART 2 – PRODUCTS**2.1 SILL PROTECTORS**

- .1 Door Sill Protectors; Bent 316 Stainless Steel Checkered Plate, 3.0mm thick. Width to be site verified to suit sill.
- .2 Wall Protectors: 316 Stainless Steel Checkered Plate, 300mm High x 3.0mm thick with all exposed edges eased.

PART 3 – EXECUTION**3.1 EXAMINATION**

- .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.
- .2 Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- .1 Install components at locations shown. Where location is not given install as directed by Consultant. Install Owner supplied accessories.
- .2 Install components in accordance with manufacturer's directions in locations indicated.
- .3 Coordinate installation with work of other sections providing adjacent construction as required to achieve the conditions shown.
- .4 Securely fasten components level and plumb. Mounting heights, where applicable, as shown; where not shown, as directed by Consultant.

3.3 CLEANING AND ADJUSTING

- .1 Upon completion of work or when directed, remove all traces of protective coatings or paper.
- .2 Test mechanisms, hinges, locks and latches and where necessary, adjust and lubricate and ensure that accessories are in perfect working order.

END OF SECTION



HL ENGINEERING

ELECTRICAL SPECIFICATIONS

FOR PROJECT:

TLDSB DOORS 2026

**HL PROJECT NO.: 26026
ISSUED FOR PERMIT/TENDER
MAY, 2026**



HL ENGINEERING LTD
7725 BRICHMOUNT RD, UNIT 46,
MARKHAM, ON
L3R 9X3
TEL: 905-713-0003



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TITLE

26 01 00

Electrical General Requirements

26 05 00

Common Work Results - Electrical

26 05 10

Grounding

Part 1 General

1.1 SUMMARY

- .1 Division 00, General Requirements is part of this Section and shall apply as if repeated here.
- .2 Unless specified otherwise, this Section shall apply to all Sections of Electrical Divisions, 26, 27, & 28. The Electrical Contractor's scope shall include Divisions 26, 27, & 27.
- .3 Conform to the conditions stated in the Contract Documents.
- .4 This Section of the Specifications is an integral part of the Contract Documents and shall be read accordingly.

1.2 INTENT AND SCOPE OF WORK

- .1 The Work shall include all labour, materials, tools, equipment, services and incidentals, etc., necessary to provide the complete systems.
- .2 The intent of these specifications is to provide complete systems that are ready for operation, and while no attempt has been made to detail or list each individual part required.
- .3 Sections of these Specifications are not intended to delegate functions nor to delegate Work and supply to any specific trade.
- .4 The Specifications are integral with the Drawings which accompany them. Neither is to be used alone. Any item or subject omitted from one, but included in the other is properly specified.
- .5 Wherever differences occur in the Contract Documents, the maximum conditions and higher standards will govern and be allowed for in the Contract Price. The item to be incorporated will be at the option of the Consultant.

1.3 DEFINITIONS

- .1 Where used, words "Electrical" or "Electrical Work", "Electrical Divisions", "Electrical Systems" shall include all Work in Divisions of 26, 27 and 28.
- .2 Where used, words "Section" and "Division" shall also include other Subcontractors engaged on Site to perform work to make the building and Site complete in all respects.
- .3 Where used, the word "Product" shall mean the material, equipment, component, machinery, or fixture forming the completed Work.
- .4 Where used, the word "connect" shall mean to supply and install all wiring and raceways and make all power connections to Products.
- .5 Where used, the word "supply" shall mean to include all labour, materials and services to furnish to the Site in the location required or directed complete with accessory parts, but is not intended to include installation.

- .6 Where used, the word "install" shall mean to include all labour, materials and services to secure in place Products, including receiving, unloading, transporting, storage, uncrating, installing, connecting and performance of such testing and finish Work as is compatible with the degree of installation specified complete ready for use.
- .7 Where used, the word "provide" shall mean to supply and install as each is described above.
- .8 Where used, the word "commission" shall mean to start-up and initial operation of Products as required to demonstrate satisfactory operation of Products and the entire system including calibration of any instrumentation.
- .9 Where used, the word "Work" shall mean the total construction required by the Contract Documents and includes all labour, Products and services.
- .10 Where used, wordings such as "approved, to approval, as directed, permitted, permission, accepted, acceptance, report to", shall mean "approved, directed, permitted, accepted, report to", by the Consultant.

1.4 STANDARDS AND REGULATIONS

- .1 Conform to latest version of the applicable standards and regulations, including Federal, Provincial and Municipal laws, By-laws, regulations, Codes and Standards and the requirements of other authorities having jurisdiction in the area where the Work is to be performed. Minor changes required by an authority having jurisdiction shall be carried out without change to the Contract Price. Standards established by the Drawings and Specifications shall not be reduced by applicable codes or regulations.
- .2 Comply with the latest editions and all amendments of the following standards and regulations. Where conflicts in requirements occur, the higher standards shall apply.
 - .1 Canadian Standards Association (CSA) Standards
 - .2 Underwriter's Laboratories of Canada (ULC) Standards
 - .3 Canadian Underwriters Association (CUA) Standards
 - .4 Ontario Building Code (OBC)
 - .5 Ontario Fire Code (OFC)
 - .6 National Building Code of Canada (NBCC)
 - .7 National Fire Code of Canada (NFCC)
 - .8 National Fire Protection Association (NFPA) Standards
 - .9 Ontario Electrical Safety Code (OESC) and Bulletins
 - .10 Electrical Safety Authority (ESA) Requirements
 - .11 National Electrical Manufacturers Association (NEMA) Standards
 - .12 Electrical and Electronic Manufacturers Association of Canada (EEMAC) Standards
 - .13 All standards and regulations mentioned in other Sections of this Division

1.5 TENDERS AND FORMS

- .1 State separate prices in the Bid Form for the Work indicated in the Contract Documents. Prices shall include the complete cost of the Work, i.e. all equipment, wiring, material,

labour, incidentals, profit, overhead, etc, excluding taxes. It shall be the Owner's option to delete from the Contract any of the Work indicated at the prices stated.

- .2 Cash allowances shall be carried in the Contract for the Work indicated, including all equipment, wiring, material, labour, incidentals, profit, overhead, etc, excluding taxes. If the actual cost is less than the Cash Allowance, the remainder shall be reverted to the Owner. If the actual cost exceeds the Cash Allowances, the Owner will reimburse the extra amount.

1.6 PERMITS AND FEES

- .1 Apply for, obtain, and pay for permits, licenses, certificates, connection charges and inspections required by authorities having jurisdiction. Include any premiums applicable due to requirements for after office hour inspections.
- .2 Submit all required documentation to the authorities for their approval and comments before starting any Work. Provide all additional drawings, details or information as may be required. Comply with any changes requested by Authorities as part of the Contract, but notify the Consultant immediately of such changes.

1.7 EXAMINATION OF SITE AND CONDITIONS

- .1 Examine the Site and local conditions prior to tender submission.
- .2 Examine carefully all Drawings and complete Specifications to ensure that Work and equipment will satisfy Site conditions and performance requirements as shown. The Drawings do not show all Site conditions and existing equipment. The Contract Price shall cover all existing Site conditions.
- .3 No allowance will be made later for any expense incurred through failure to make these examinations or to report any such discrepancies and omissions in writing, five Working Days prior to tender closing.
- .4 Examine the work of Other Contractors and report at once any defect or interference affecting the work, its completion or warranty.
- .5 Submission of a tender confirms that the Contract Documents and Site conditions are completely understood and accepted without qualifications unless exceptions are specifically indicated in the Bid Form.

1.8 CONTRACT DOCUMENTS

- .1 The Contract Drawings of this Division are performance drawings and indicate the scope and general arrangement of the Work. They are diagrammatic except where specific details are given.
- .2 They shall be read in conjunction with Architectural, Structural, Mechanical and all other Division Drawings of the Contract.
- .3 The Drawings do not show all conduits and/or wiring or all structural, mechanical and architectural details.

- .4 Obtain accurate dimensions from the architectural and structural Drawings, or by Site measurement. Locations and elevations of services are approximate and must be verified before construction is undertaken.
- .5 Make changes required to accommodate structural conditions, (beams, columns caps, etc.). Obtain the Consultant's approval before proceeding.
- .6 Adjust the location of materials and/or equipment up to 3 meters in any direction as instructed without adjustment to Contract Price, provided that the instructions are given before installation and rough-in.
- .7 Plan and install conduit runs respecting all applicable conditions including structural, mechanical and architectural details.

1.9 SHOP DRAWINGS

- .1 Prepare and submit shop drawings of all Products in accordance with Division 1-General Requirements as specified herein and in each Section of this Division.
- .2 PDF files are acceptable.
- .3 Shop drawings shall have a minimum 210 mm x 285 mm (8-1/2" x 11") clear space on the front sheet, suitable for stamping. The cover sheet shall include the project name, Contractor's name and Product description. Where multiple Products are submitted in one binding, include an index of all equipment as the front sheet.
- .4 Assume full responsibility for submission of shop drawings. Allow a minimum of 10 Working Days for the Consultant review.
- .5 The Consultant will only review shop drawings bearing the Electrical Division and Contractor's stamps of approval.
- .6 Submit shop drawings showing the following:
 - .1 Contract name
 - .2 Contract number
 - .3 Manufacturer's name and model number
 - .4 Supplier's name
 - .5 Approval agencies
 - .6 Shipping and working weight
 - .7 Performance characteristics
 - .8 Dimensions, including required clearances
 - .9 Electrical characteristics
 - .10 Bill of materials and finishes
 - .11 Time required to fabricate and deliver
 - .12 All variations from Contract Documents
 - .13 Construction and field connection details
 - .14 Installation requirements
- .7 The review shall not relieve the Contractor of its responsibility to provide Products in accordance with the design intent and Contract Documents.

- .8 Manufacturer's printed data sheets for standard items are acceptable providing pertinent characteristics are identified and relate to specified items.
- .9 Each shop drawing shall be checked and stamped as being correct, by trade purchasing item, and by the Contractor, before drawing is submitted.
- .10 Where applicable, provide wiring details, schematics, single line drawings, and wiring diagrams showing interconnection with the Work of other Divisions.
- .11 Verify and check dimensions to ensure proper installation of equipment in available space and without interference to the Work of other Divisions. Ensure that electrical and all other coordination is complete prior to submission of shop drawings.
- .12 Provide data sheets and samples for all wiring devices and wall plates prior to installation. Device and plate colours/finishes to be confirmed prior to ordering.
- .13 Where requested, submit samples of Products for review and approval.
- .14 Do not have equipment delivered to the Site until a shop drawing for the item has been reviewed.

1.10 EXISTING, INTERFERENCE AND DETAIL DRAWINGS

- .1 Submit complete existing electrical system drawings prior to construction work.
- .2 Existing drawings shall show complete and accurate existing electrical system conditions, location of all devices and equipment, conduits and wires, junction boxes and power suppliers to building loads.
- .3 Prepare Existing, Interference and Details Drawings in conjunction with all parties and trades concerned showing sleeves and openings and passage of piping and conduits through building structure. Drawings shall also show inserts, curbs, equipment bases, anchors, special hangers and weights on all load points.
- .4 Prepare fully dimensioned detail drawings of Products and services in electrical rooms, service and ceiling spaces, and all other critical locations. Coordinate the Work with all other Divisions. Base drawings on reviewed shop drawings and indicate all details pertaining to access, clearances, sleeves, electrical connections, and elevations of pipes, ducts and conduits. Include location of access doors provided under this Division.
- .5 Ensure that clearances required by jurisdictional authorities are indicated on the interference drawings.
- .6 The Owner will not consider any extra cost as a result of the Contractor's failure to prepare proper drawings. Submit drawings two (2) weeks after receipt of the Notice to Commence the Work.

1.11 RECORD DRAWINGS

- .1 Conform to the General Requirements. Maintain at least 2 sets of documents and clearly mark on same as the Work progresses, changes and deviations from Work shown so that on completion the Owner will have records of the exact location of ducts and equipment and a record of material and equipment changes.

- .2 The Contractor shall obtain a clean set of prints at the start of Contract Work and shall keep these prints up-to-date at the Site, accurately recording all changes made on the project and locating all services, equipment, etc. which may have been shown only diagrammatically on the Contract Documents.
- .3 The Contractor shall ensure that as-built information is accurately recorded and shall check same. As-Built drawings shall be reviewed at each Site meeting.
- .4 Prepare record drawings showing the following:
 - .1 All buried conduit runs are to be shown complete with dimension from building lines.
 - .2 Inverts of all services entering and leaving the building and at property lines
 - .3 Dimensions of underground services in relation to property lines at key points of every run
 - .4 Elevations of underground services in relation to ground floor level of the building
 - .5 Location of all services embedding in the structure, utilizing grid line references
 - .6 Dimensioned locations of all services left for future work
 - .7 All changes to the Work due to Change Orders and Site Instructions
 - .8 All changes to the Work during construction
 - .9 All changes to structural and architectural elements that affect the backgrounds of this record set
 - .10 Location and designation of all electrically supervised valves, flow switches and pressure switches
 - .11 Location and designation of all items requiring access or service in a hidden location
 - .12 Location of all access doors provided under Electrical Division
 - .13 All changes and revisions to Specifications, details and equipment schedules
 - .14 All homerun conduits, junction boxes for complete electrical systems
- .5 Upon completion of the Work, prior to the Substantial Performance inspection, the Contractor shall neatly transfer recorded information and make As-Built submission.

1.12 OPERATION AND MAINTENANCE MANUAL

- .1 The Contractor will be responsible for collecting and organizing three (3) copies of all data, operating instructions, maintenance and trouble-shooting instructions, parts lists, parts diagrams, evidence of all tests and certifications, complete reviewed shop drawings, etc. and assembling them in neat manuals in hard cover. Identify cover "Operation and Maintenance Manual for NAME OF THE PROJECT". Manuals shall be separated with dividers in logical sections and volumes.
- .2 The Contractor shall also collect from Subcontractors and Suppliers all Guarantees/Warranties specified in the Contract Documents. Check that starting date (date of Total Performance of the Work) and extent of each guarantee/warranty are clearly indicated. Check also that all guarantees/warranties indicate the Supplier's Name or Subcontractor's Name as appropriate together with contact phone number. Assemble neatly in labelled section of each manual.

- .3 Prior to requesting the Substantial Performing inspection, submit one (1) copy for review. Make all corrections as requested and forward the corrected two (2) copies to the Owner.

1.13 SCHEDULING

- .1 Comply with the construction schedule. Conform to phasing of Work if applicable. Conform to interim and final completion dates.
- .2 Coordinate the Electrical schedule with general construction schedule.
- .3 Submit a bar chart schedule showing the start and completion dates for each activity based on a critical path analysis of the Work.
- .4 Include in the schedule for Electrical Work done by others, e.g. Power Supply Authority connection.

1.14 ALTERNATES AND SUBSTITUTIONS

- .1 Substitute Products will only be considered when tendered Products become unobtainable. State in the tender the proposed substitute and amount added or deducted.
- .2 It is the responsibility of the Contractor to ensure "Substitute Products" fit the space allotted and provides the performance specified in the Contract Documents.
- .3 If Products manufactured and/or specified by a manufacturer named as equivalent are used in lieu of the manufacturer specified, the Contractor shall be responsible for ensuring that the substituted Product is equivalent in performance and operating characteristics to the specified Product, and, it shall be understood that all costs for additional space, larger power feeders and changes to associated or adjacent Work will be borne by the Contractor offering the substitution. In addition, in Equipment Rooms where Products named as equivalent is used in lieu of specified Products and the dimensions of such Products differs from the specified Products, prepare and submit for approval, accurately dimensioned layouts of rooms affected.

1.15 VALUATION OF CHANGES

- .1 For each change submit a complete itemized breakdown of labour and material.
- .2 Only the net difference between an extra and a credit will be subject to overhead and profit mark up.
- .3 Material shall be valued at current trade prices incorporating all discounts and labour rates. Overhead and profit shall be as shown in the Tender Form.

1.16 WORKMANSHIP

- .1 Workmanship and method of installation shall conform to best standards and practice and be performed to approval. Work shall be done by tradesmen skilled in the type of work to be performed. Where required by local or other By-laws and Regulations, tradesmen shall be licensed in their trade. Install all Work and equipment according to the manufacturer's printed directions.

1.17 INSTALLATION REQUIREMENTS

- .1 Coordinate the Work of this Division with the Work of all other Divisions. Inform the Subcontractors for the Work of other Divisions of the locations of openings, chases, sleeves, supports, services, connections, etc., to be incorporated into the Work.
- .2 Check the locations of all expansion/building joints and ensure that all electrical installations, are at or crossing these locations, are as detailed and as required to compensate for the possible movement at the joint.
- .3 Confirm the exact location of outlets, fixtures and connections. Check architectural details and elevations for more requirements. Confirm location of connection points for equipment supplied under other Divisions or by the Owner.
- .4 Install neatly all equipment and apparatus to allow free access for maintenance, adjustment and eventual replacement.
- .5 Install metering and/or sensing devices to provide accurate and reliable sampling of quantities being measured. Install instruments to permit easy observation.
- .6 Provide suitable shielding and physical protection for devices.
- .7 Install all Products and services in accordance with the manufacturer's requirements and/or recommendations.
- .8 Provide all supports, hangers and fasteners. Secure all Products and services so as not to impose undue stresses on the structure and systems.
- .9 Ensure that the load onto structures does not exceed the maximum loading per square meter (foot) as shown on structural Drawings or as directed.
- .10 Do not use explosive activated tools.

1.18 FIELD REVIEW

- .1 The Owner and Consultant shall have access to the Site at all times for review of the Work during construction.
- .2 Arrange for review of Products during manufacturing.
- .3 Provide all gauges, instruments and other necessary measuring equipment required for review of the Work.
- .4 Maintain a complete set of Contract Documents at all times for field reference.
- .5 Correct any deficiencies as they are reported during the performance of the Work.

1.19 TEMPORARY SERVICES

- .1 Provide temporary office, workshop and tools and material storage space for the Work and assume responsibility for any loss or damage thereto. Buildings erected for this purpose shall conform in appearance to those erected for similar purposes under other Divisions of the Specifications.

- .2 Provide temporary lighting for whole construction area.
- .3 Provide scaffolding and shoring necessary for the Work of this Division. Scaffolding and shoring shall be adequate to protect the workmen according to Provincial and Local Regulations.
- .4 Provide rigging and mill-wrighting, labour and equipment necessary for the Work of this Division. Employ only workmen well experienced and skilled in such trades for this portion of the Work.
- .5 Provide hoisting machinery, operators, labour and materials necessary to lift and place equipment supplied under this Division.
- .6 The permanent systems or any part thereof shall not be used during construction for construction purposes, unless so permitted in advance by the Owner, in writing.

1.20 PROTECTION AND CLEANING

- .1 Securely plug or cap open ends of electrical raceways or equipment to prevent entry of dirt, dust, debris, water, snow or ice.
- .2 Equipment stored on Site shall be protected from weather and kept dry and clean at all times. Take care to avoid corrosion of metal parts.
- .3 Protect all finished and unfinished Work of this and other Divisions from damage due to carrying out of this Work.
- .4 Make good any damage caused directly or indirectly to walls, floors, ceilings, woodwork, brickwork, finishes, etc.
- .5 Before energizing any systems, inspect and clean the inside of all panelboards, switchgear and cabinets to ensure that they are completely free from dust and debris.
- .6 Clean all polished, painted and plated Work. Clean all lighting fixtures. Remove all debris, surplus material and tools.
- .7 Carry out additional cleaning operations of systems as specified in other Sections of this Division and as Division 1 requires.

1.21 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling.
- .3 Divert unused wiring and metal materials to a metal recycling facility, or place in appropriate on-site bins for recycling.

1.22 MOCK-UPS AND TRIAL USAGE

- .1 Provide mock-ups in accordance with the conditions stated in the Contract Documents and Division 1 of the Specifications.

- .2 Trial usage of any equipment or materials shall not be construed as evidence of acceptance of same and no claim for damage shall be made for injury to, or breaking of, any part of such Work which may be so used.

1.23 COMMISSIONING

- .1 Be responsible for commissioning of all Work provided under this Division. The total commissioning requirements of this Division involve:
 - .1 Complete activation of all systems
 - .2 Calibration, testing and verification of all systems
- .2 Commissioning shall commence with activation and verification of all systems in accordance with requirements of the Specifications. This will include, but not be limited to, the following items to be tested, adjusted and verified:
 - .1 Lighting and power distribution
 - .2 Fire alarm system
 - .3 Emergency lighting system
 - .4 Electric heating equipment/system

1.24 TESTING

- .1 Carry out all tests specified in the Contract Documents and tests required by authorities having jurisdiction. The testing and adjusting is the responsibility of the Contractor.
- .2 Provide all equipment, labour, instruments, expenses of the manufacturer's representative, and incidentals, and pay for all power and fuel required to carry out the tests.
- .3 Submit the record of all tests signed by the Contractor's Superintendent and, where applicable the manufacturer's representative. Show in schedule form a record of the systems or parts of systems tested, the date of the test, the circumstances such as current, temperatures, etc., the duration of the test and any special remarks pertaining to events during the test. Note the test has been witnessed by authorities having jurisdiction.
- .4 Submit certification letters from the manufacturers of all equipment certifying that their technical representatives have inspected and tested their equipment and are satisfied with the methods of installation and operation. Where existing systems are extended, provide letters covering both new and existing equipment and connections. These letters shall state the names of persons present at testing, methods used and a list of functions performed with location and room numbers where applicable.
- .5 Conduct the following tests, at a minimum:
 - .1 Fire alarm system test
 - .2 Emergency lighting system test
 - .3 Power distribution, including control and switching, polarity tests, voltage-drop tests and phase balancing measurement
 - .4 General operations: energize and operate electrical circuit and item
 - .5 Circuits originating from branch distribution panels
 - .6 Lighting and lighting control
 - .7 Motors, heaters and associated control equipment, including sequenced operation

- .8 Di-electric tests, hi-pot tests, insulation resistance tests and ground continuity tests as required by nature of various systems and equipment
- .9 Demonstrate systems operation
- .10 Repair, alter, replace, test and adjust as necessary for a complete and operating electrical system

1.25 INSPECTION

- .1 Arrange for inspection of all Work by the authorities having jurisdiction. Upon completion of the Work furnish final unconditional certificates of approval by the inspection authorities.
- .2 Application for final review will be considered when the Work has been completed and written declarations submitted that all commissioning, testing adjustment, set up and documentation is complete. Final review shall be done when:
 - .1 All reported deficiencies have been corrected.
 - .2 All systems have been balanced, tested, commissioned and are operational.
 - .3 The Owner has been instructed in the operation and maintenance of all equipment.
 - .4 All reports have been submitted and reviewed.
 - .5 All maintenance manuals have been submitted and reviewed.
 - .6 All tags and nameplates are in place and all data submitted and reviewed.
 - .7 Cleaning up is finished in all respects.
 - .8 All certificates are furnished.
 - .9 All spare parts and replacement parts specified have been provided.
 - .10 All record drawings have been submitted and reviewed.

1.26 DEMONSTRATION AND INSTRUCTION

- .1 Provide personnel, equipment and tools to demonstrate and instruct the Owner's designated personnel in the operation, controlling, adjusting, trouble-shooting and servicing of all systems and equipment to satisfaction of the Owner. This Work shall take place during the Owner's regular business hours prior to acceptance.
- .2 Where specified elsewhere in this Division, manufacturers shall provide demonstration and instructions.
- .3 Where deemed necessary, the Owner's agent may record these demonstrations via video tape or other means for future reference.

1.27 WARRANTY

- .1 Provide a written guarantee stating that systems, equipment, components, etc. have been installed to manufacturer's instructions, that systems meet the Contract requirements and that all deficiencies in material and labour occurring within two (2) years after Substantial Performance of the work, will be corrected at no charge to the Owner.
- .2 Obtain Product warranties in excess of two (2) years from the manufacturer on behalf of the Owner. These Product warranties shall be issued by the manufacturer to the benefit of the Owner.

- .3 Instruct all manufacturers and suppliers that warranties on Products will commence upon the date of Total Performance of the Work and not from the date the Products are put into operation.
- .4 All corrections to deficiencies listed in field review reports and other correspondence, as well as but not limited to those indicated in testing, adjusting, balancing and commissioning, shall be completed prior to turn over.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section of the Specifications is an integral part of the Contract Documents and shall be read accordingly.
- .2 Comply with Section of Electrical General Requirements.
- .3 Unless specified otherwise, this Section shall apply to all Sections of Electrical Divisions, 26, 27, & 28
- .4 Work to be done under this Section shall include furnishings of labour, materials, and equipment required for installation, testing and putting into proper operation complete electrical systems as specified in the Contract Documents, as shown on the Drawings and as otherwise required. Complete systems shall be left ready for continuous and efficient satisfactory operation.

1.2 SUBMITTALS

- .1 Submit shop drawings and Product data for Products specified in this Section in accordance with Section of Electrical General Requirements.

1.3 QUALITY ASSURANCE

- .1 Electrical Work shall be carried out by qualified, licensed electricians.

Part 2 Products

2.1 PRODUCTS

- .1 Products shall be new, of Canadian manufacture where available, first quality and uniform throughout. The Contractor shall submit in tender based on the use of Products specified in the Contract Documents, or on the listed acceptable alternate Products as further noted.
- .2 Electrical Products shall be CSA or ULC approved and be so labelled. Products not CSA/ULC approved shall receive acceptance by the Owner for installation, and modifications and charges required for such acceptance shall be included in the Work of this Section.
- .3 Products shall not be installed or connected to the source of electrical power until approval is obtained.
- .4 Where a manufacturer is not specified, provide Products of high commercial standard and quality consistent with the standards of these Specifications. Provide Products of the same manufacture for like applications unless noted otherwise in the Contract Documents.

- .5 Products shall be designed and manufactured in accordance with latest issue of applicable Standards or authorities when such are either mentioned herein, or have jurisdiction over such materials or items of equipment. Confirm capacity, ratings and characteristics of Products being provided to supply power to equipment provided under other Sections of the Work. Resolve discrepancies before such items are purchased.
- .6 Acceptance of Products installed presumes that Products have not been damaged or exposed to conditions that would adversely affect performance and life expectancy. If in the opinion of the consultant, Products have sustained damage, or have been exposed to abnormal conditions it shall be the responsibility of the Contractor to have such tests performed as are deemed necessary by the Consultant to establish the condition and therefore, acceptability of installed Products.

2.2 ELECTRICAL IDENTIFICATION

- .1 Cable and conduit
 - .1 Identify conduits and cables for the various systems by the use of the following distinctive coloured labels. The labels shall comprise pressure sensitive plastic tape with printing labels indicating the system. Apply a small area of paint to the inside of each outlet box, pull box and panel as it is being installed. Identify junction boxes in suspended ceiling areas with colour on both inside and outside.
 - .1 Power system - yellow
 - .2 Fire alarm systems – red
 - .2 Locate identification labels as follows:
 - .1 Behind each access
 - .2 At each change of direction, at junction boxes, and at both ends of each run
 - .3 Not more than 15m apart in straight runs
 - .4 Where passing through a wall, partition, and floor; one on each side of the wall, partition, and floor
- .2 Cable and conduit labels
 - .1 For power and lighting system feeders, install labels at either end of the conductors where terminated inside of equipment to match wiring diagram conductor identification or panelboard circuit numbers. Typical identification Panel AA circuit - 21; use "AA-21". For a three phase circuit provide identification on phase A conductor only. For a single phase circuit provide identification on the phase conductor.
 - .2 For lighting branch circuits identify circuit at panel and in outlet box connection to lighting fixture. Install label on phase conductor tap-off. Typical identification if fixture connected to Panel A, circuit 5; marker identification A-5.
 - .3 For branch circuits supplying single phase and three phase devices such as receptacles and connections to equipment identify conductors at panel and in device outlet box. Install label on phase conductor inside outlet box. Typical identification if device is connected to Panel B - circuit 14, marker identification "B-14".

- .4 For switchboards identify all control conductors at terminal strips inside equipment and where terminated at all remote devices. Identification shall match the numbering system on the Drawings and "Reviewed" shop drawings.
- .5 For fire alarm systems, identify all conductors at terminal strips located in:
 - .1 Control panels.
 - .2 Annunciators.
 - .3 Printers.
 - .4 Local terminal cabinets.
 - .5 All remote devices.
 - .6 All connections in the system.
 - .7 Provide identification in accordance with the numbering system on the "Reviewed" shop drawings.
- .6 For miscellaneous systems identify all conductors at terminal strips located in:
 - .1 Control and/or monitoring panels.
 - .2 Control and/or monitoring stations.
 - .3 Local terminal cabinets.
 - .4 All remote devices.
 - .5 All connections in the system.
 - .6 Provide identification in accordance with the numbering system on the "Reviewed" shop drawings.
- .3 Equipment nameplates
 - .1 Provide lamacoid name plates, white background with black engraved letters 0.4" (10 mm) high, for electrical equipment but not limited to panels, switchboards, transformers, disconnect switches, breakers, contactors, relay panels, starters, TVSS, FACP and miscellaneous panels.
 - .2 Nameplates shall indicate voltage, capacity, upstream, and downstream equipment. Typical identification for panel: "Lighting Panel C, 230/415V, 3 phase, 4 W. Supplied from Panel BB".
 - .3 Install plates after all painting has been completed. Secure with mechanical fastening devices except on the inside of panel doors where gluing will be acceptable.
- .4 Power system colour code
 - .1 Power system phase colour code:
 - .1 Red - Phase A
 - .2 Black - Phase B
 - .3 Blue - Phase C
 - .4 Neutral - White
 - .5 Ground - Green
 - .2 Identify incoming utility service lines with enamel paint conforming to the above colour code.
 - .3 Band buses in switch board and panels shall conform to the above colour code.
 - .4 Provide branch conductor conforming to the above colour code.
- .5 Manufacturer's nameplates

- .1 Have the manufacturer's nameplates affixed to each item of all equipment showing the size, name of equipment, serial number and all information usually provided, including voltage, cycle, phase, horsepower, etc., and the name of the manufacturer and its address. Ensure that all stamped, etched or engraved lettering on plates is perfectly legible. Ensure that nameplates are not painted over. Where apparatus is to be concealed, attach the nameplate in an approved location on the equipment support or frame.
 - .2 Ensure that panels and other apparatus which have exposed faces in finished areas do not have any visible trade marks or other identifying symbols. Mount nameplates behind doors.
- .6 Signage
- .1 Provide signage to the local inspection authority on all equipment and electrical rooms.
 - .2 The suitable warning signs must be installed as per the Electrical Safety Code.
 - .3 Where applicable, provide warning signs for ground fault protection circuit as required by ESC.
 - .4 Where applicable, provide warning signs and marking for the power disconnect switches for fire pumps as per NFPA-20, section 9.3.

2.3 WIRES AND CABLES

- .1 Comply with the requirements of the latest editions of the followings:
 - .1 CSA C22.2 No. 0.3, Test Methods for Electrical Wires and Cables
 - .2 CAN/CSA-C22.2 No.131 – Type TECK 90 Cable
 - .3 CSA C22.2 No. 38, Thermoset Insulated Wires and Cables
 - .4 CSA C22.2 No. 75, Thermoplastic-Insulated Wires and Cables
 - .5 CSA C22.2 No. 65, Wire Connectors
- .2 Use copper conductors RW90XLPE and/or RWU90XLPE, 90°C rated insulation unless otherwise noted in the Contract Documents.
- .3 All wire and cable voltage rating shall be 600V. All outdoor wire and cable shall be -40 Deg. C rated.
- .4 Direct burial cable is **not** acceptable. All wire and cable shall be run in conduit.
- .5 Solid conductors of #12AWG and smaller. Stranded conductors for #10 AWG and larger.
- .6 Except as indicated hereinafter, wire for lighting and receptacle branch circuits to be #12 AWG except that #10 minimum to be used where the home run exceeds 27m (90').
- .7 Minimum #10 for all exterior lighting circuits.
- .8 Wire for control circuits to be #12AWG minimum, and for 24 volt control circuits to be #18 AWG minimum.
- .9 Wire to ceiling outlet boxes on which a lighting fixture is or may be mounted, with conductors having insulation suitable for 90°C.

- .10 Cables located in plenum, ceiling or floor spaces shall be totally enclosed in non-combustible conduit or raceway or be armoured cable where permitted by the Ontario Building Code.
- .11 Unless specified otherwise in the Contract Documents, wire for branch circuits shall be 2#12 + Ground in 16mm conduit.
- .12 Wires and cables for outdoor locations shall be rated accordingly.
- .13 Armoured cables shall be complete with interlocked aluminum armour, approved fastening and connectors and meet the requirements of Vertical Flame Test-Cables in Cable Tray of CSA C22.2 No. 0.3. The PVC jacket cables (TECK 90 and ACWU90) shall be FT6 rated.
- .14 Install all wiring in raceways, unless indicated as armoured. Route wire and cable to meet project conditions. Use suitable cable fittings and connectors.
- .15 Use an approved lubricant to assist in pulling conductors through conduit. Neatly train and lace wiring inside boxes, equipment and panelboards.
- .16 Balance the loading on feeders so that unbalanced load is less than 10%.
- .17 Limit the voltage drop at the end of feeders and branch circuits to 2% at the rated load of the circuit.
- .18 Lighting fixture wiring in accessible ceiling spaces shall be run in conduit from the lighting panel to ceiling outlet boxes with armoured cable drops no longer than 2m permissible from the boxes to fixtures.
- .19 Protect all exposed non-armoured cables in manholes, pull pits and trenches with an approved fire protective fibreglass tape of '3M' manufacture or approved equal. Extend the protective wrapping on the cables where they leave pull pits or trenches below switchgear to the circuit breaker or fused switch terminals. Rack cables in manholes and pull pits to provide clear access for maintenance and servicing.
- .20 Splice wire, up to and including No. 6 gauge, with nylon insulated expandable spring pressure type connectors. Splice large conductors using compression type connections insulated with heat shrink sleeves.

2.4 RACEWAYS AND FITTING

- .1 Drawings do not show all raceways. Those shown are generally in diagrammatic form only.
- .2 Comply with the requirements of the latest editions of the following:
 - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware
 - .2 CSA C22.2 No. 45, Rigid Metal Conduit
 - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit

- .4 CSA C22.2 No. 62, Surface Raceways and Lighting Fixture Raceways and Fittings
 - .5 CSA C22.2 No. 83, Electrical Metallic Tubing
 - .6 CSA C22.2 No. 126, Cable Tray System
 - .7 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit
 - .8 CAN/CSA C22.2 No. 227.3, Flexible Non-metallic Tubing
 - .9 CSA C22 No. 18, Outlet Boxes, Conduits Boxes, Fittings and Associated Hardware
- .3 Conduits
- .1 Steel galvanized electrical metallic tubing (EMT) installed:
 - .1 In partitions;
 - .2 In ceiling spaces;
 - .3 In service spaces.
 - .4 In masonry walls.
 - .2 Rigid steel conduit hot dip galvanized inside and outside installed:
 - .1 On the exterior of building;
 - .2 Where exposed to mechanical damage;
 - .3 Where conduits turn up or turn down out of concrete slab;
 - .4 Damp and wet locations.
 - .3 Rigid PVC (unplasticized) conduit except for exit light, emergency lighting, and fire alarm system installed:
 - .1 In slabs with rigid steel galvanized turn-up;
 - .2 Underground with rigid steel galvanized turn-up;
 - .3 In concrete walls;
 - .4 Damp and wet locations.
 - .4 Flexible armoured conduit:
 - .1 In partitions;
 - .2 For lighting fixture drops;
 - .3 From ceiling junction boxes into wall outlets;
 - .4 Flexible armoured conduits shall be limited to 10'-0" lengths where run horizontally from take-off junction boxes.
 - .5 Liquid tight flexible conduit:
 - .1 Final connection to motors.
 - .2 Any equipment which vibrates or generates noise.
 - .6 Provide green ground/bond wire in all conduits.
 - .7 Provide bushings on the ends of all conduits in enclosure, boxes, panels and cabinets, to protect the conductor installation. Except where grounding bushings are specified, use all plastic insulated bushings with a temperature rating of 150°C with double locknuts.
 - .8 For EMT use steel concrete tight set screw fittings as manufactured by T & B or equal. Die cast or pressure cast fittings are not acceptable.
 - .9 For rigid steel conduit use only insulated throat set screw type fittings. Threadless, die cast or pressure cast fittings are not acceptable.

- .10 Use PVC conduit for all landscaping locations where conduit comes in contact with soil. Refer to the Landscape Drawings for the final elevation of planting soil. Co-ordinate and adjust electrical devices accordingly. Use epoxy glue coupling, and formed offsets. Approved manufacturers are Scepter Mfg. Co. Ltd and CGE "Cobocon".
- .11 Conceal all conduits except in service spaces, mechanical rooms, electrical rooms and ceiling spaces.
- .12 Install all locknuts and bushings to ensure a secure mechanical and electrical bond. Use Erickson couplings in lieu of running threads.
- .13 Where conduit joints occur in concrete, use silicone sealing compound to make water tight.
- .14 Lay out conduit to drain free of all moisture.
- .15 Securely hold conduits in place in concrete or masonry during pouring and construction operations; provide templates, forms and spacers as necessary.
- .16 Support multiple runs of conduit on channel or angle iron with rod hangers.
- .17 All exposed conduits shall be run parallel to building lines and to other conduits.
- .18 Secure all conduits in place with conduit clamps T & B or equal. Perforated pipe straps, wire lashings, wood screws or nails are not acceptable.
- .19 Provide conduit expansion joints where conduits cross building expansion joints, also in straight runs of conduit 30 m (100') or longer. Conduit expansion joints shall be telescoping sleeve type, with insulated bushings and ground jumper.
- .20 Make field bends and offsets uniform and symmetrical without flattening conduit. Minimum bending radius shall be ten (10) times the conduit diameter.
- .21 Ream conduit ends to remove burrs and sharp edges. Fit conduit stubs with waterproof plastic caps during installation to protect threads and to prevent entrance of moisture into conduit.
- .22 Test all conduits for clear bore using ball mandrel, brushes and snake. Clear any conduit which rejects the ball mandrel. Replace if necessary. Bear all costs involved in making all Work good, restoring all surfaces to their original pre-construction condition.
- .23 Install a continuous nylon cord 180 kg (400 lb) test in each conduit left empty.
- .24 Install a correctly sized green copper ground wire within each conduit.
- .25 Provide conduit seals in conduits which pass to the outside.
- .26 Provide pull boxes, fittings or junction boxes in conduit runs, on the basis of not more than two (2) right angle bends or their equivalent or not more than 30 m (100'), in straight runs between boxes. For outdoor direct buried conduit, up to 50m.
- .27 Size conduits to code requirements, provide larger sizes where noted in the Contract Documents.
- .28 Size conduits for low voltage wiring in accordance with the manufacturer's recommendations.
- .29 Provide conduit sealing fittings and correspond for hazardous application to Electrical Safety Code requirements.
- .30 Maximum conduit size permitted in a concrete slab shall be 35 mm. In any case verify with Structural Consultant for acceptability.

- .31 Where multi-conduits parallel run and/or crossover in concrete slab/wall, verify with Structural Consultant for acceptability.
- .4 Surface metal raceway
 - .1 The surface metal raceway systems shall consist of surface metal raceway, appropriate fittings and device brackets to complete installation.
 - .2 The raceway is to be utilized in dry interior locations only in accordance with the Ontario Electrical Safety Code.
 - .3 Submit drawings for approval showing the complete layout of all Products that make up the complete system for each floor prior to installation with raceway lengths, device type (power and data), locations and circuits identified, complete with data sheets and samples.
 - .4 The surface raceway system specified herein for branch circuit wiring and/or data network, voice, video and other low-voltage wiring shall be Hubbell HBL4750 series or Wiremold V4000 Series. The raceway shall be metal, two-piece design with a base and a snap-on cover. The raceway shall be complete with one integral barrier in the base for power/data separation. Power shall be in top; data in the bottom. Finish shall be ivory unless otherwise noted in the Contract Documents.
 - .5 Complete with power receptacles and telecommunication outlets as required.
 - .6 Receptacle / Data plates shall be Wiremold V4047 series, or equaled by Hubbell.
 - .7 For individual devices located on surfaces where conduit cannot be recessed in finished area, provide single or double channel raceway system Products: Wiremold V500/V700/V2400, ivory finish, or equalled by Hubbell.
- .5 Install raceways system complete with appropriate fittings such as connectors, bushings, elbows, couplings, locknuts, expansion fittings, fasteners and supports and accessories supplied as integral parts of assembly, as specified in the Contract Documents. Installation shall comply with Regulatory Authorities requirements.
- .6 Neatly install exposed raceway running parallel to, and at right angles to, building lines and equally spaced in groups.
- .7 Keep raceway ends parallel and on proper spacing to suit knockouts or raceway openings in equipment or enclosure.
- .8 Keep raceways at least 150 mm clear of heating pipes, flues and hot item surfaces. Where the required clearance cannot be provided, obtain written approval alter the layout or to reduce clearance.
- .9 Provide expansion couplings, with bonding jumper and ground clamps where raceways cross building control joints.
- .10 Use only metallic, enclosed raceway on installation that require shielding of electrical cables or where installed in ceiling used as return air plenum, as specified or indicated on Drawings.
- .11 Raceways shall have established positive low resistance paths to ground and effectively isolate conductors so that any short-circuit arc is confined.
- .12 Select appropriate fittings, such as grounding bushings, bonding and grounding straps, to maintain continuity and effectiveness of grounding of raceway system.

- .13 Provide necessary fasteners and supports acceptable for type and size of raceways, to ensure a rigid, complete assembly.
- .14 Provide suitable inserts or expansion type machine bolts for fastening raceways, fittings, boxes and equipment to concrete surfaces.
- .15 Do not use wood screws, lag screws, expansion shields, rawl plugs and nylon inserts.
- .16 Secure raceway and other associated Work to structure members. Raceway shall not be supported from the ceiling suspension system.
- .17 Thoroughly clean raceway and dry clear obstructions before pulling cable or wire.
- .18 Minimum raceway size: 16mm (1/2") conduit equivalent system.

2.5 OUTLET AND CONDUIT BOXES

- .1 Comply with the requirements of latest edition of the followings:
 - .1 CSA Standard C22.2 No.18, Outlet Boxes, Conduit Boxes and Fittings
 - .2 CSA Standard C22.2 No. 85, Rigid PVC Boxes and Fittings
- .2 Outlet and conduit boxes - general
 - .1 Size boxes in accordance with CSA C22.1.
 - .2 102mm square or larger outlet boxes as required for special devices.
 - .3 Gang boxes where wiring devices are grouped.
 - .4 Blank cover plates for boxes without wiring devices.
 - .5 347V outlet boxes for 347V switching devices.
 - .6 Combination ganged boxes with appropriate steel removable barriers where outlets for more than one system are grouped.
 - .7 Where standard make boxes are not suitable, provide boxes of special design to fit space and other requirements.
 - .8 Where vapour proof lighting is specified, provide matching vapour proof ceiling or wall junction boxes and fittings as required.
- .3 Sheet steel outlet boxes
 - .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76mm x 50mm x 38mm or as indicated in the Contract Documents. 102mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
 - .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102mm x 54mm x 48mm.
 - .3 102mm square or octagonal outlet boxes complete with steel fixture studs where supporting lighting fixtures. Die cast fittings are not permitted.
 - .4 102mm square outlet boxes with extension and plaster rings for lush mounting devices in finished plaster or tile walls.
- .4 Masonry boxes

- .1 Electro-galvanized stamped steel masonry single and multi gang boxes for devices flush mounted in exposed block walls, minimum size 95mm x 50mm x 64mm standard.
- .5 Concrete boxes
 - .1 Electro-galvanized stamped steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.
- .6 Recessed floor boxes and outlets
 - .1 For concrete and wood floor:
 - .1 Concrete tight electro-galvanized sheet steel floor boxes with adjustable finishing rings to suit floor finish with brushed aluminum cover plate. Confirm exact cover finish to suit floor finish prior to ordering devices during the shop drawings review.
 - .2 Minimum 2 compartments for both power and communication and 4-gang capability
 - .3 Device mounting plates (brackets) to accommodate power receptacles and communication outlets.
 - .4 Complete with minimum 2 duplex power receptacles and one communication single gang plate for 2 communication outlets.
 - .5 Minimum size: 254mm x 204mm x 76mm (deep)
 - .6 Wiremold Resource #RFB series or equal
 - .2 Poke-thru type boxes for floor with access from below:
 - .1 UL fire rated of 2hr, water tight, suitable for plenum space.
 - .2 Die-cast aluminum cover, confirm exact cover finish to suit floor finish prior to ordering devices during the shop drawings review.
 - .3 Minimum 2 compartments for both power and communication and 2 1/2-gang capability
 - .4 Device mounting plates (brackets) to accommodate power receptacles and communication outlets.
 - .5 Complete with minimum 2 duplex power receptacles and one communication single gang plate for 2 communication outlets.
 - .6 Wiremold Evolution #6AT series or equal
 - .3 Raised Access Floor Boxes and outlets
 - .1 Die-cast aluminum housing with 2 compartments for both power and communication, 3-gang capability
 - .2 Flush in raised floor tile complete with lift-up cast aluminum recessed cover and cable lid. Confirm exact cover finish to suit floor finish prior to ordering devices during the shop drawings review.
 - .3 Device mounting plates (brackets) to accommodate power receptacles and communication outlets.
 - .4 Complete with 2 duplex power receptacles and one communication single gang plate for 2 communication outlets.
 - .5 Minimum: 203mm x 152mm x 114mm.
 - .6 Wiremold #AF series or equal
- .7 Conduit boxes

- .1 Cast FS or FD aluminum, or feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.
- .2 PVC FS or FD boxes or PVC conduit where required in special corrosive areas as indicated on the Drawings.
- .8 Fittings - general
 - .1 Bushing and connectors with nylon insulated throats.
 - .2 Knock-out fillers to prevent entry of debris.
 - .3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits
 - .4 Double locknuts and insulated bushings on sheet metal boxes
- .9 Installation
 - .1 Support boxes independently of connecting conduits. Install all boxes vertically plumb and securely fastened so associated trades will not cause the box to be misaligned.
 - .2 Where interior recessed boxes on exterior wall, a good vapour barrier continuity technique shall be employed such as Iberville or Mold Processors 1004-VB plastic backboxes.
 - .3 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of the Work.
 - .4 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
 - .5 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washer is not allowed.
 - .6 Size and install appropriate boxes and enclosures in accordance with applicable section(s) of Ontario Hydro Electrical Safety Code and the manufacturer's recommended procedures.
 - .7 Co-ordinate the location and installation of boxes so as to be accessible and clear from the building system equipment.
 - .8 Install pull boxes in inconspicuous but accessible locations.
 - .9 Use pull boxes for conduits larger than 35mm. Use conduit outlet bodies for conduit 35mm.
 - .10 Provide approved hole plugs in unused conduit knockouts and openings.
 - .11 Furnish boxes and enclosures with corrosion resistant machine screws.
 - .12 Boxes and enclosures embedded in concrete for flush-mounted, shall be secured properly with connecting conduits and related Works set in place before concrete is poured. Forms, when used, shall be able to be removed without disturbing installed boxes or enclosures.
 - .13 Ensure junction and outlet boxes mounted in ceiling cavities do not interfere with removal of ceiling tiles.
 - .14 Use masonry boxes for flush mounting in exposed block walls, concrete boxes for flush mounting in concrete wall.
 - .15 Furnish conduit boxes with neoprene gaskets for outdoor area or hazardous area application.
 - .16 Install all wall boxes for door security access devices, fire alarm devices, etc., adjacent to lock side of door openings unless otherwise shown on the Drawings. Check door swing before installing any switch.

- .17 Install all boxes in walls so that tapped holes for mounting wiring devices or fixtures will be aligned vertically or horizontally, as required. Where boxes are grouped at one location with common and varying mounting heights, align boxes horizontally and vertically from centre line unless otherwise indicated in the Contract Documents.
- .18 Offset outlet boxes in sound attenuating partitions to avoid undue transmission of sound between the partition elements. Use flexible conduit connections where wiring is required between outlet boxes on opposite sides of partition.
- .19 Offset outlet boxes where installed on either side of a fire separation.
- .20 Where steel supports are required for outlet boxes, wood supports are not acceptable.
- .21 Maintain integrity of vapour barriers along building perimeter wall where flush outlet boxes are required.

2.6 ACCESS PANELS AND DOORS

- .1 All access panels and doors shall be Milcor or Bel, 12 gauge with concealed hinges.
- .2 In glazed tile walls provide #304 alloy stainless steel with #4 finish recessed frame and secured with stainless steel countersunk flush head screws.
- .3 In plaster surfaces provide dished steel door for plaster finish with welded metal lath and plastic grommet for keyhole.
- .4 In other finishes use plain steel door with lock and anchor straps, complete with factory prime coat.
- .5 In lay-in ceilings, tiles properly marked may serve as access panels.
- .6 Provide the appropriate Subcontractors for other Divisions of the Work with panels and doors, complete with frames and all pertinent information for installation. Ensure that all panels and doors are flush mounted and properly aligned with building modules and grids. Indicate locations on record drawings.
- .7 Select all access panels and doors to provide adequate access, and to suit appropriate architectural finish, minimum size 150 mm x 150 mm (6" x 6"). Where necessary for persons to enter, provide minimum 600 mm x 450 mm (24" x 18") size doors.

2.7 METALS

- .1 Provide all other electrical Work such as, but not limited to, equipment bases, supports, catwalks, framework to support checker plates and electrical equipment above trenches and cable pits, ladders, pit and trench covers, etc. Have such Work carried out in accordance with the requirements of Division of Metals.

2.8 SLEEVES AND CURBS

- .1 Provide conduit sleeves of galvanized steel for conduit and cable runs passing through concrete walls, beams, slabs and floor. Cut flush with finished surface.
- .2 Extend galvanized conduit sleeves for conduit rising through slabs a minimum of 4" above finished floors.

- .3 Through exterior walls below grade waterproofed floors, and other waterproof walls use heavy weight cast iron pipes machine cut. Extend sleeves 100 mm (4") above finished floors, and cut flush with underside of floor.
- .4 For rectangular duct openings for bus ducts and cable tray use minimum 18 gauge galvanized steel sleeves or provide a removable wood box-out of the required size. Brace sleeves to retain their position and shape during the pouring of concrete and other work.
- .5 Seal sleeves and openings to maintain fire rating. Use 3M™ Fire Barrier Sealant CP 25WB+, Dow-Corning #3-6548 'Silicone RTV' foam, Thomas & Betts 'Flamesafe' firestop system, installed in accordance with the manufacturer's specifications and recommendations.
- .6 Seal all openings and sleeves after installation of equipment:
 - .1 With an approved material to maintain fire rating where sleeves and openings pass through fire separations and floors.
 - .2 With an approved material to maintain fire rating for sleeves and openings provided for future equipment.
- .7 Size sleeves to provide 13 mm (1/2") clearance all around.
- .8 Provide all flashing and waterproofing for sleeves through the roof and exterior walls in accordance with the requirements of Division of Thermal and Moisture Protection.
- .9 Except where furred in, provide watertight concrete curbs, 100 mm (4") high by 100 mm (4") wide with 19 mm (3/4") chamfered edges around all sleeves and openings passing through waterproof floors.

2.9 SUPPORTS AND BASES

- .1 Submit the proposed method of attachment of hangers and beam clamps, to cellular steel deck for approval before proceeding with Work.
- .2 Supply and erect special structural Work required for the installation of electrical equipment. Provide anchor bolts and other fastenings unless noted otherwise in the Contract Documents. Mount equipment required to be suspended above floor level, where details are not shown, on a frame or platform bracketed from the wall or suspended from the ceiling. Carry supports to either the ceiling or the floor, or both as required, at locations where, because wall thickness is inadequate, it is not permitted to use such brackets.
- .3 Electrical panels, switches or other electrical equipment shall be complete with suitable bases or mounting brackets.
- .4 Provide channel or other metal supports where necessary, to adequately support lighting fixtures. Do not use wood unless wood forms part of the building structure.
- .5 Secure supports, in general to structure, from inserts in concrete construction or from building structural steel beams, using beam clamps. Provide additional angle or channel steel members, required between beams for supporting conduits and cables.

- .6 Provide any additional supports required from existing concrete construction for any piping or equipment, by drilling same and installing expansion bolt cinch anchors.
- .7 Do not use explosive drive pins in any section of Work without obtaining prior approval.
- .8 Hangers for electrical conduit shall be galvanized after fabrication. Conduit hangers shall be as manufactured by:
 - .1 Burndy Canada Ltd.
 - .2 Canadian Strut Products Ltd.
 - .3 E. Myatt & Co. Ltd.
 - .4 Steel City Electric Co.
 - .5 Pilgrim
 - .6 Thomas & Betts
 - .7 B-line
- .9 Do not use, perforated strapping (grappler bars).
- .10 Steel supports in wet or dry locations shall be galvanized after fabrication.
- .11 Provide concrete housekeeping pads or bases for all floor mounted equipment 100 mm (4") high with 19 mm (3/4") chamfered edges, keyed to the floor slab and extending at least 100 mm (4") on all sides of the equipment. Where draw-out truck type circuit breakers are provided extend pad to accommodate complete withdrawal of breaker. Provide and set all anchor bolts.
- .12 Use only factory made threaded or toggle type insert.
- .13 Place inserts only in structural members and not in the finishing material.
- .14 Provide bus ducts, cable trays, and wireways with fire barriers at each floor level and fire separation.
- .15 Provide locations and dimensions for all pads and curbs and provide and set all anchor bolts for all concrete Work provided under Division of Concrete.

2.10 SPARE PARTS

- .1 Furnish spare parts and maintenance materials as recommended by the equipment manufacturer for the warranty period.

2.11 DOOR MONITORING ALARMS

- .1 Provide stand alone battery-operated magnetic local door monitoring alarms.
- .2 Complete with on-off switch, 120dBA alarm, mounting hardware, operation batteries, white finish.
- .3 Phillips # LRM3320W/27, or equal.
- .4 Provide warning signs on doors, as required, "emergency exit, alarm will sound".

Part 3 Execution

3.1 NEUTRALS AND PHASING

- .1 Provide one (1) identified grounded neutral conductor for each set of branch circuits connected to different mains of each panel.
- .2 For circuits identified as computer dedicated (D) or isolated ground (IG), provide individual neutral per identified circuit.
- .3 Install a separate neutral for each GFCI circuit when the GFCI is located at the panelboard.
- .4 Connect two or three (2 or 3) circuits sharing a common neutral to different mains or phases.
- .5 Balance the connected loads across the mains of each panel to within 15%.
- .6 Circuit numbers on the panels must correspond to the numbers on the Drawings.
- .7 Connections in all equipment to be Phase A, B and C from left to right, and front to back when viewing from the front or accessible direction.

3.2 MOUNTING HEIGHTS

- .1 Mounting heights are from floor level to centre line of device outlet, unless noted otherwise in the Contract Documents. Confirm all locations before installation. In all areas accessible to persons in wheelchairs, the mounting heights of all switches, thermostats, intercom switches, pull stations, etc., shall comply with the Ontario Building Code "Barrier Free" requirements.
- .2 The mounting heights of all power and lighting devices shall comply with Ontario Electrical Safety Code requirements. The mounting heights of all fire alarm devices shall comply with CSA requirements.
- .3 If mounting height of equipment is not specified or indicated in the Contract Documents, verify before proceeding with installation.
- .4 Install electrical equipment at the following heights (centre of device) unless indicated otherwise in the Contract Documents.
 - .1 Wall switches, dimmers, timers, speed controllers, speaker volume controllers, thermostat: 1100 mm.
 - .2 Wall receptacles:
 - .1 General: 350 mm.
 - .2 Above top of continuous baseboard heater: 250 mm.
 - .3 Above top of counters or counter splash backs: 250 mm.
 - .4 In mechanical rooms: 1100 mm. (gang with switch)
 - .3 Panelboards: as required by Code or as indicated in the Contract Documents.
 - .4 Wall mounted speakers: 150 mm below ceiling.
 - .5 Door bell pushbuttons and door open push buttons: 1100 mm.

- .6 Security key switches, card readers and intercom switches: 1100mm.
- .7 Security wall-mounted motion sensor: 2300mm, or 150mm below ceiling.
- .8 Service receptacle for roof mounted equipment: 750mm above finished roof.

3.3 WIRING OF MECHANICAL EQUIPMENT

- .1 The locations of starters, motors and associated equipment indicated on the Drawings are approximate and diagrammatic only. Coordinate with the Work of the Mechanical Division to ensure the proper location of all the equipment. The exact locations of conduit terminations at mechanical units shall be determined from the equipment manufactures' approved shop drawings. Conduits must be installed to enter only in the locations designated by equipment manufactures.
- .2 All electric baseboard heaters, cabinet heaters, force flow unit heaters and heating cables shall be provided under Electrical Division. Electric duct heaters shall be provided under Mechanical Division.
- .3 Electrical Division shall provide safety disconnect switches required at motors by CESC whether shown on the Drawings or not. Provide power wires and connections to all mechanical equipment.
- .4 All the motor starters/controllers, and/or line voltage thermostats shall be supplied under Mechanical Division and installed under Electrical Division.
- .5 All control wiring, control devices and low voltage thermostats shall be provided under Mechanical Division.
- .6 Where motor starters, switches and the like, are grouped together, provide suitable plywood backboard to which all such equipment shall be secured.
- .7 Where the single-phase exhaust fan shall be controlled by manual switch, power connections to the fan, heavy-duty toggle control switch and the safety disconnect means shall be provided under Electrical Division.

3.4 SERVICES TO EQUIPMENT SUPPLIED BY OWNER / OTHER DIVISIONS

- .1 Provide all necessary connections required for equipment supplied by the Owner and under other Divisions. Examine all Drawings and Specifications and identify all requirements.
- .2 Verify the type, rating and location of all outlets and/or connections required for all equipment provided by the Owner and under other Divisions.
- .3 Provide isolation devices as required to the equipment for all services.

3.5 PROVISION FOR FUTURE EQUIPMENT AND CONSTRUCTION

- .1 Spaces designated for future equipment or building expansion shall be left clear.
- .2 Provide services for future extensions complete with Products necessary for present termination and to permit future extension.

- .3 Identify each service by a permanent marker at its termination point.

3.6 CUTTING AND PATCHING

- .1 Provide all cutting and patching required for the Work of Electrical Division. Work shall be carried out in conformance with the requirements of Concrete Division. Include any radiography required to locate concealed services before penetrating into inaccessible locations.
- .2 Any modifications to building shall be done so as not to diminish structural, fire resistance, or smoke barrier integrity.
- .3 Proposed modifications to the structure shall require acceptance by the Structural Engineer.
- .4 The Consultant shall be afforded the opportunity to review the intent prior to any major cutting.

3.7 PAINTING

- .1 Provide all exposed ferrous metal Work, and Products, except conduit, with at least one (1) factory prime coat or paint one prime coat on Site. Clean up or wire brush all equipment before painting. The primer shall be rust inhibiting primer in accordance with CGSB-GB-40d.
- .2 Unless otherwise noted in the Contract Documents, finish painting will be done under Division 9 of these Specifications.
- .3 Do not paint galvanized supports and hangers.
- .4 Repaint or refinish all damaged factory applied finishes.

3.8 VIBRATION AND NOISE CONTROL

- .1 Spring type vibration isolations shall be complete with horizontal spring constant (kH) to vertical (kV) ratio between one and two to assure stability. Select springs to operate no greater than 2/3 solid deflection. For indoor mounting use springs with one (1) coat of zinc chromate primer and two (2) coats of paint. For outdoor mounting use springs of neoprene coated steel or stainless steel. All spring housings to be hot dipped galvanized. Where the spring assembly is bolted to the floor provide vibration isolation washers and pads to reduce transmission of vibration.
- .2 Pad type isolators shall be rubber for indoor application, neoprene for oil filled devices and for outdoor use. Use 30 durometer rubber and 50 durometer neoprene. Select pad type isolators which do not exceed the mid-point of their recommended operating rate with maximum deflection of 20% of thickness. Use minimum 6 mm (1/4") thick pads under spring assemblies.
- .3 Provide spring type vibration isolators for IC engine driven equipment. Raise equipment to operating height, levelled with blocks and shims so that connections can be made to a rigid system at operating level before isolator adjustments.

- .4 For power class transformers provide spring or pad type isolators in accordance with the manufacturer's recommendations. Where dry type transformers are contained within unit substation enclosures mount the core and coils to the structural framing of the unit substation. Locate isolators between core and coil frame and unit substation structural frame.
- .5 Provide pad type isolators for all floor mounted dry type distribution transformers. Locate isolators between transformer enclosure and floor.
- .6 Where transformers are platform mounted from structure above provide spring hangers with levelling devices and sound pads in all supports.
- .7 Make connections to rotating, vibrating, magnetic or other noise producing equipment such as motors, transformers, and between independent structure by means of loop flexible conduits.
- .8 If objectionable noise or vibration should be transmitted to occupied portions of the building by any part of the electrical Work, make necessary changes and/or additions, to the Commissioner's approval, at no increase to the Contract Price.

3.9 CONCRETE

- .1 Concrete Work shown on the structural Drawings will be done as part of Division 3 of these Specifications.
- .2 Provide all other concrete Work necessary for the Work of this Division. Have such Work carried out in accordance with the Concrete Division 3 of these Specifications.

3.10 WORK IN EXISTING BUILDING AND SITE

- .1 Maintain the existing life safety systems in existing building in full operation at all times during construction, unless otherwise noted in the Contract Documents.
- .2 Maintain all existing systems in full operation during normal occupancy and operation hours, unless otherwise noted in the Contract Documents.
- .3 Maintain all systems adjacent to the construction area in full operation at all times during construction, unless otherwise noted in the Contract Documents.
- .4 All noise generating works that disrupt the building operations shall be carried out before/after normal occupancy hours and shall be coordinated with Owner.
- .5 Co-ordinate with the Owner for scheduling of Works required to be done before/after normal occupancy hours, including but not limit to: drilling through slab; power shutdown; interference to life safety system. All costs involved with this Work shall be included in Contract Price.
- .6 The Contractor shall assume responsibility for any disruption caused by its forces to operational building services. Repair any system damaged during the execution of the Work.

- .7 Scan (X-ray or ultrasound) for unknown existing concealed conduits, pipes, cables/wires, before excavating ground and drilling slabs.
- .8 Provide temporary lights in the construction area to carry out the Work.
- .9 Provide temporary power connections to temporary services during construction.
- .10 Disconnect and remove materials and equipment as shown and as specified in the Contract Documents.
- .11 The existing electrical conduits/wiring to remain in ceiling spaces, interfering with new installation, shall be raised or re-mounted.
- .12 All new conduit installations in ceiling shall be fastened tight to the ceiling structure or rod suspended at high level to the underside of the ceiling slab.
- .13 Where circuits to be removed which are fed from panels outside of the construction area, remove feeder back to panel, make safe circuit and update panel directories.
- .14 Make safe all circuits to be cut off.
- .15 Maintain continuity of existing services for other circuits/devices serving areas outside the construction area. Provide additional wiring/conduits/boxes etc. to suit existing services to be maintained and also implement new Work as detailed in the Contract Documents.
- .16 Check and inspect existing distribution equipment to be re-used (i.e., panel breakers, disconnect switches, etc.) for abnormal thermo-graphic scan under actual loads in operation and submit scan results indicating problems have been corrected.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section of the Specifications is an integral part of the Contract Documents and shall be read accordingly.
- .2 Comply with Section of Electrical General Requirements.
- .3 Provide all grounding to comply with the Ontario Electrical Safety Code and the latest instructions of the Inspection Authority, with any further requirements as noted herein.

Part 2 Products

2.1 MATERIALS

- .1 All grounding conductors shall be stranded copper, bare or insulated as required, in conduit sized to meet electrical safety requirements unless otherwise noted in the Contract Documents.
- .2 Use Cadweld process for all weld connections. Burndy and/or AMP of Canada Ltd. mechanical grounding connectors are an acceptable equivalent to welded connections.
- .3 All ground connectors shall be designed and approved for grounding purposes.

2.2 Execution

2.3 INSTALLATION

- .1 Bond all interior non-electrical metallic piping systems to the electrical system ground including, but not limited to, water supply, wastewater, and gas systems.
- .2 Bond all conduit, and all non-current carrying metal parts, equipment cases, frames, bases, brackets, etc.
- .3 Bond each piece of fixed equipment back to the switchboard or panel feeding that equipment, by one of the following methods:
 - .1 Where equipment is fed by a steel conduit, provided sizing is adequate, utilize conduit for the ground return conductor. At switchboard provide a grounding bushing, and strap such conduits to the ground bus (size per Code).
 - .2 Where the size of the conduit is inadequate (per Code), or if the conduit is flexible, install a separate insulated copper ground inside the conduit. At the switchboard or distribution panel, provide a grounding bushing, loop the ground conductor through the bushing, and connect to the switchboard ground bus. At the fixed equipment, connect to an internal ground bus, or connect to the inside of the metal enclosure utilizing approved screws and connectors (remove all paint).
 - .3 For branch circuits, the conduits may be used for grounding, provided seamless steel fittings are used on EMT and threaded fittings are used on rigid conduit. At each receptacle connect a stranded copper ground wire from the outlet box to the

- grounding terminal on the receptacle. Install a separate grounding conductor in all PVC conduits.
- .4 Where equipment is fed by a multi-conductor power cable, provide a ground conductor in the cable. At the switchboard or panel, connect to the ground bus. Use a grounding connector on the cable for positive grounding of the metallic sheath. Loop the ground wire to the grounding connector.
 - .4 Run a separate ground wire in all flexible conduits. Connect each end to ground bus or lug or connector.
 - .5 Where mechanical protection is required for insulated grounding conductors install in rigid conduit. Use rigid PVC conduit in concrete or below grade slab and aluminum conduit in other locations.
 - .6 Provide weld connection or mechanical grounding connectors for:
 - .1 All connections between grounding conductors
 - .2 All connections to building steel
 - .3 All connections between grounding conductors and cable lugs
 - .7 Where single ground conductor is in one conduit, the conduit must be non-ferrous.
 - .8 Arrange grounding to provide the minimum impedance paths for ground fault currents. Provide any additional grounding required for approval by the inspecting authorities.

END OF SECTION