

1 GENERAL

- 1.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1 apply to and form all Sections of the Contract Documents and the Work.
- 1.2 No person(s), firm or corporation other than the Construction Manager and their Trade Contractor(s) have any interest in this Contract, or in the proposed Trade Contractors.
- 1.3 It is intended that work supplied under this Specification shall be complete in every detail for the purpose required. This Contract shall include materials not herein mentioned, but which may be found necessary to complete or perfect any portion of Work in accordance with requirements and intent of this Specification. Work not specified or shown in either the Drawings or in Specifications, but involved in carrying out their intent, or in the complete and proper execution of the work, is required and shall be performed by the Construction Manager as though it were specifically delineated or described.
- 1.4 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Trade Contractors, nor between the Trade Contractor and their Trade Contractors. The Trade Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract.
- 1.5 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.
- 1.6 Contractors finding discrepancies or ambiguities in, or omissions from the Drawings, Specifications or other Contract Documents, or having doubt as to the meaning and intent of any part thereof shall contact the Consultant for clarification.
- 1.7 Mention in the specifications or indicate on the drawings, materials, products, operations, or methods, requiring that the Trade Contractor provide each item mentioned or indicated to the quality or subject to the qualifications noted. Perform, according to the conditions stated, each operation prescribed, and provide labour, materials, Products, equipment and services to complete the Work.
- 1.8 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.
- 1.9 The terms “approved”, “review”, “reviewed”, “accepted”, “acceptance”, “acceptable”, “satisfactory”, “selected”, “directed”, “instructed”, “required”, “submit”, “permitted”, “approved alternative”, “approved equal” or similar words or phrases are used in standards or elsewhere in Contract Documents, it shall be understood, that words “by (to) the Consultant” follow, unless context provides otherwise.

- 1.10 The term 'or approved alternative' following a list of Products, systems, or manufacturers used in the Contract Documents shall be construed to mean approved by Consultant. Specified products to be Base Bid. Trade Contractor to follow 'Substitution' procedures specified in this Section for submitting proposed Products, systems, and manufacturers and obtain Consultant's approval of the same prior to proceeding with ordering proposed Products and systems or engaging manufacturers. Trade Contractors who purchase Products and systems or engage manufacturers prior to Consultant's review and acceptance do so at their own risk.
- 1.11 Where the words 'submit', 'acceptable' and 'satisfactory' are used in the Contract Documents, they shall be considered to be followed by the words 'to the Consultant' unless the context provides otherwise.
- 1.12 The terms "exposed" or "exposed to view" refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

2 **USE OF PREMISES AND SITE**

- 2.1 The work shall be confined to the area defined on the drawings except that services connections and certain portions of landscaping, hard paving and curb work shall be executed on Municipal property under regulations of authorities having jurisdiction.
- 2.2 Certain restrictions exist as to the use by the trades of various portions of the place of work. The trades shall familiarize themselves with these restrictions and shall establish their work plan to accommodate these restrictions. No claims for extra costs due to such restrictions will be considered by the Owner.
- 2.3 Individual trades shall have partial use of premises for performance of the Work, in which case trades shall assume responsibility for premises assigned to them for performance of the Work.
- 2.4 Traffic or storage of materials, debris, offices, storage sheds, is permitted only in locations specifically designated by Construction Manager. Use only access routes to and from such storage areas as permitted by Construction Manager.
- 2.5 Trades shall limit their use of premises to areas designated by Construction Manager.

3 **OWNER OCCUPANCY**

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

4 EXISTING SITE CONDITIONS

- 4.1 Make a careful examination of the site, investigate, and be satisfied as to all matters relating to the nature of the Work to be undertaken, the means of access and egress thereto and therefrom, the obstacles to be met with, the extent of the Work to be performed and any and all matters which are referred to in the Contract Documents.
- 4.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Construction Manager prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Construction Manager.

5 ACCESS/PROPERTY CONSTRAINTS

- 5.1 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.
- 5.2 Organize delivery of materials/equipment to and removal of debris and equipment from place of Work, to permit continual progress of work and to suit restricted site conditions.
- 5.3 Determine and make arrangement as required for loading and unloading of equipment and Products with the Construction Manager. Conform to Owner's requirements with regard to parking restrictions and other conditions.
- 5.4 All Products, materials and equipment required on Site shall be portable and/or size suitable for access and movement on Site and without causing damage to buildings.
- 5.5 Personnel access and material deliveries to the Site shall be only by routes designated by the Construction Manager.

6 PARKING

- 6.1 Free parking will be permitted on Site in location as permitted by the Owner. Parking area is not to disrupt the performance of Work, Site safety or the movement of vehicular or pedestrian traffic and are to be acceptable to the Consultant.

7 COORDINATION

- 7.1 Cooperate and coordinate with Other Trade Contractors including Other Trade Contractors employed by Owner. Ensure that Subtrades coordinate their work to have the Work performed expeditiously and to be satisfactory in all respects at completion. Ensure cooperation of workers in laying out and performing Work. Maintain efficient and continuous supervision.

- 7.2 Ensure that subtrades cooperate with other subtrades whose work attaches to or is affected by their own work. Ensure that minor adjustments are made to make adjustable work fit fixed work.
- 7.3 Ensure subtrades coordinate and make reasonable provision in the work for the work of other subtrades including splicing and sequencing of installation at no extra cost to the Owner.
- 7.4 Allow access of Other Trade Contractors on Site and to areas of Work. Cooperate and coordinate with such Other Trade Contractors. Schedule work to complement work of such Other Trade Contractors.
- 7.5 Placing, installation, application and connection of work by the Owner's own forces or by Other Trade Contractors on and to the Trade Contractor's Work shall not relieve the Trade Contractor of his responsibility to provide and maintain the specified warranties.
- 7.6 Coordinate with removals/installations specified in other Divisions and Other Contracts.
- 7.7 Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Trade Contractors and Subtrades wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.
- 7.8 Install ceiling mounted components in accordance with final ceiling plans. Inform Construction Manager of conflicting installations.
- 7.9 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and products to conserve headroom and space with minimum interference and in neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of structure as possible unless shown otherwise.
- 7.10 Make provision for unrestricted relocation of light fixtures to replace ceiling panels at grid spaces of the same size, without interference or restriction by items located within the ceiling space.
- 7.11 Where supports or openings are to be left for the installation of various parts of the Work furnish the necessary information to those concerned in ample time so that proper provision can be made for such items. Have cutting, drilling and other remedial work, and the subsequent patching or other work required for failing to comply with this requirement, performed at a later date at no additional Cost to Owner.

- 7.12 Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other Sections, and that such information is communicated to the applicable installer. Have cutting, fixing and making good to the work of Other Trade Contractors, Subtrades required for, and make up time lost as result of, failure to comply with this requirement, at no additional cost to Owner.
- 7.13 Be responsible for coordinating products supplied in metric (SI) and imperial units into the overall layout.
- 7.14 Properly coordinate the work of the various Sections and trades to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Trade Contractor to coordinate the Work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections and submit these drawings to the Construction Manager for review before the commencement of Work.
- 7.15 In case of damage to active services or utilities, notify Construction Manager and respective authorities immediately and make all required repairs under direction of Construction Manager and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular working hours at no additional cost to Owner.

8 REQUEST FOR INTERPRETATION/INFORMATION (RFI)

- 8.1 A request for interpretation/information (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents. An RFI shall not constitute notice of claim for a delay.
- 8.2 Submittal procedures:
- .1 RFI form:
- .1 Submit RFI on a form acceptable to the Consultant. Consultant shall not respond to an RFI except as submitted on this form.
- .2 Where RFI form does not provide sufficient space for complete information to be provided thereon, attach additional sheets as required.
- .3 Submit with RFI form all necessary supporting documentation.
- .2 Submit RFI form as follows:
- .1 1 copy digitally in PDF format to Consultants.
- .2 Submit RFI's sufficiently in advance of affected parts of the Work so as not to cause delay in the performance of the Work. Costs resulting from failure to do this will not be paid by Owner.
- .3 RFIs shall be submitted only to Consultant.
- .4 RFIs shall be submitted only by Construction Manager. RFI's submitted by Subcontractors or Suppliers shall not be accepted.

- .5 Number RFI's consecutively in one sequence in order submitted.
- .6 Submit one distinct RFI per RFI form.

- .3 RFI log:
 - .1 Maintain log of RFI's sent to and responses received from Consultant, complete with corresponding dates.
 - .2 Submit updated log of RFI's with each progress draw submittal.

- .4 Consultant shall review RFI's from the Construction Manager submitted in accordance with this section, with the following understandings:
 - .1 Consultant's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Cost of the Work or Contract Time or changes in the Work.
 - .2 Only Consultant shall respond to RFI's. Responses to RFI's received from entities other than the Consultant shall not be considered.

- .5 Allow 10 Working Days for review of each RFI by the Consultant.
 - .1 Consultant's review of RFI commences on date of receipt by Consultant of RFI submittal and extends to date RFI returned by Consultant.
 - .2 When the RFI submittal is received by Consultant before noon, review period commences that day; when RFI submittal is received by Consultant after noon, review period begins on the next working day.
 - .3 If, at any time, Construction Manager submits a large enough number of RFI's such that Consultant cannot process these RFI's within 10 Working Days, Consultant, will confer with the Construction Manager within 3 Working Days of receipt of such RFI's, and the Consultant and the Construction Manager will jointly prepare an estimate of the time necessary for processing same as well as an order of priority between the RFI's submitted.

- .6 Construction Manager to satisfy itself that an RFI is warranted by undertaking a thorough review of Contract Documents to determine that the claim, dispute, or other matters in question relating to performance of the Work or the interpretation of Contract Documents cannot be resolved by direct reference to the Contract Documents. Construction Manager to describe in detail this review on the RFI form as part of the RFI submission. RFI submittals that lack such detailed review description, or where the detail provided is, in the opinion of Consultant, insufficient, shall not be reviewed by Consultant and shall be rejected.

9 **CUTTING AND PATCHING**

- 9.1 Execute Work to avoid damage to other Work.
- 9.2 Execute cutting, fitting and patching including excavation and fill to complete the Work.
- 9.3 Employ appropriate trades with skilled labour to perform cutting Work.
- 9.4 Fit Work segments together, to integrate with penetrations through surfaces and with other Work.

- 9.5 Remove and replace defective and non-conforming Work.
- 9.6 Do any drilling, cutting, fitting, patching and finishing that may be required to make the various classes and kinds of other Work fit together in a professional and finished manner. Make watertight connections with adjoining structures.
- 9.7 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- 9.8 Execute Work by methods to avoid damage to other Work and which will provide proper surfaces to receive patching and finishing.
- 9.9 Cut Products using proper equipment and methods. On rigid materials, use a masonry saw or core drill. Pneumatic or impact tools are not allowed on masonry work without prior approval.
- 9.10 Where new Work connects with existing structures, cut, patch and make good existing work to match original condition.
- 9.11 Be responsible for correct formation and bridging of openings in masonry and structural walls as required.
- 9.12 Ensure compatibility between installed Products and security of installation.
- 9.13 Restore Work with new Products in accordance with requirements of the Contract Documents.
- 9.14 Fit Work airtight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.
- 9.15 Properly prepare surfaces to receive patching and finishing.
- 9.16 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.
- 10 **FIRE SEPARATIONS**
- 10.1 Conform to following requirements to maintain continuity of fire separations whether or not shown on the Contract Drawings.
 - .1 Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are non-combustible and are tightly fitted and sealed with a ULC approved sealant for the assembly being sealed.
 - .2 Construction that abuts on or is supported by a non-combustible fire separation shall be constructed so that its collapse under fire conditions will not cause the collapse of the fire separation.

.3 Do not use combustible members, fastenings, attachments and similar items to anchor electrical, mechanical or other fixtures to fire separations.

.4 At penetration through fire rated walls, ceilings or floors, completely seal voids with ULC approved firestopping material; full thickness of the construction element. In locations that require a smoke seal, provide appropriate ULC approved system installed in accordance with the manufacturer's recommendations.

10.2 Ensure integrity of fire separations is maintained where they are penetrated.

11 PRECONSTRUCTION MEETING

11.1 Within 3 days after award of Contract, the Construction Manager will arrange a Preconstruction meeting of parties in the Contract to discuss and resolve administrative procedures and responsibilities at the Owners' offices, and set all construction meetings for each portion of the project.

12 PROGRESS MEETINGS

12.1 The Construction Manager's Project Manager shall schedule, administrate and chair all site meetings every 2 weeks (or more often as required) which shall be attended by the Owner throughout the progress of the Work. Schedules shall be update every 2 weeks by the Site Superintendent for distribution at each meeting.

12.2 Attend regularly scheduled progress meetings to be held on Site at times and dates that are mutually agreed to by the Owner, Construction Manager, and Trade Contractor.

12.3 Co-ordinate and organize attendance of individual subtrades and material suppliers when requested. Relationships and discussions between subtrades participants are not the responsibility of the Construction Manager and do not form part of the meetings content.

12.4 Ensure that Trade Contractor representatives in attendance at meetings have required authority to commit Trade Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.

12.5 The Project Manager shall prepare the Agenda for all site meetings in consultation with the Consultant's Contract Administrator, and shall distribute written, either via fax or by e-mail, notice of each meeting minimum 4 days in advance of meeting date to all parties required to attend.

12.6 Be prepared to provide specific information relative to agenda items at each meeting as they are pertinent to the Contract.

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- 12.7 Agenda will include but not be limited to the following topics as are pertinent to the Contract.
- .1 Review and agreement of previous minutes.
 - .2 Safety.
 - .3 Status of submittals.
 - .4 Quality control.
 - .5 Co-ordination.
 - .6 Contract Schedule
 - .7 Work plan up to next scheduled meeting.
 - .8 Requests for information/clarification.
 - .9 Contemplated changes.
- 12.8 Construction Manager shall record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.
- 13 **SCHEDULING**
- 13.1 Be responsible for planning and scheduling of the Work. Be responsible for ensuring that subtrades plan and schedule their respective portions of the Work. Subtrades schedules shall form part of the above mentioned schedules.
- 13.2 Prepare and submit the Contract Schedule within two weeks following award of Contract. Subtrade's schedule to comply with main Contract Schedule. This schedule, once it is reviewed by the Construction Manager and if it meets the Construction Manager's project requirements, will become contractual.
- 13.3 Contract Schedule shall be developed using a logic network technique for planning and scheduling.
- 13.4 Contract Schedule shall be submitted for approval in its optimum levelled form. This presentation may be in either a time scaled network or a bar chart form. It shall be subdivided into either work areas or systems as applicable.
- 13.5 Contract Schedule shall include the following information:
- .1 Starting and ending dates of each activity including the float periods;
 - .2 Manpower requirements for each activity;

- .3 Interdependency with activities of other Trade Contractors;
 - .4 Dates specified in the Contract Documents;
 - .5 Dates on which specific data will be required for submittal, i.e., Vendor data, drawings for review, etc.
- 13.6 Contract Schedule to be reviewed and updated monthly by the Trade Contractor so as to reflect any Contract changes as well as major changes to the schedule.
- 13.7 Subtrades and Suppliers to participate in collaborative planning process to improve Contract Schedule where possible.
- 14 **SUBMITTALS**
- 14.1 Provide labour, Products, equipment, services tools and supervision necessary for submittals. Provide submittals specified in this Section to Construction Manager unless otherwise specified.
- .1 Verify accuracy and completeness of submittals prior to submission.
 - .2 Verify field measurements, field construction criteria, catalogue numbers and similar data.
 - .3 Co-ordinate each submittal with requirements of the Work and the Contract Documents.
 - .4 Notify Construction Manager in writing at time of submission, of any deviation in submittals from requirements of the Contract Documents.
- 14.2 Submit in accordance with dates established; shop drawings, fabrication, manufacture, erection and installation submittals to provide adequate time for reviews, securing necessary approvals, possible revisions and resubmittals, placing orders, securing delivery to avoid construction delays.
- 14.3 Accompany each submittal with a letter of transmittal in duplicate containing all pertinent information required for identification and review of submittals including but not limited to the following:
- .1 Date of initial submission and date of each subsequent submission if required.
 - .2 Project title and Construction Manager's project number.
 - .3 Names of:
 - .1 Trade Contractor.
 - .2 Subtrades.
 - .3 Supplier/manufacturer as applicable.
 - .4 Specification section numbers to which submission is related.

- .5 Countersigned stamp of Trade Contractor certifying that they have reviewed the submission.
- 14.4 Allow two weeks for the Construction Manager's review of each submission.
- 14.5 When submittals are resubmitted, transmit under a new letter of transmission.
- 14.6 Do not carry out Work until Consultants review of submittals has been completed.
- 14.7 Be responsible for payment of charges for delivery of submissions and resubmission to Construction Manager.
- 14.8 Product data:
 - .1 Before delivery of Products to the Site, submit Product data as specified in each section or as requested by the Construction Manager.
 - .2 Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable standards.
- 14.9 Samples:
 - .1 Before delivery of Products to the Site, submit samples of Products as specified or as requested by the Construction Manager. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.
 - .2 Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:
 - .1 The quality and functional characteristics of Products, with integrally related parts and attachment devices.
 - .2 Full range of colours available.
 - .3 If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.
 - .4 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.
 - .5 Should there be any change to the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.

- .6 When samples are very large, require assembly, or require evaluation at the Site, they may be delivered to the Site, but only with approval and as directed.

14.10 Shop drawings:

- .1 Arrange for the preparation of shop drawings as called for in the Contract Documents or as may be reasonably requested by the Construction Manager. The Trade Contractor and each Subtrade shall operate as experts in their respective fields and all shop drawings and samples shall conform to the requirements of the Contract Documents.
- .2 The term "shop drawings" means drawings, diagrams, schematics, illustrations, schedules, performance charts, brochures and other data which are required to illustrate details of the Work.
- .3 In addition to shop drawings specified in the specification sections, submit shop drawings required by jurisdictional authorities in accordance with their requirements.
- .4 Shop drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring shop drawings:
 - .1 Clear and obvious notes of any proposed changes from the Contract Documents.
 - .2 Fabrication and erection dimension.
 - .3 Provisions for allowable construction tolerances and deflections provided for live loading.
 - .4 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.
 - .5 Location and type of anchors and exposed fastenings.
 - .6 Materials, physical dimensions including thicknesses, and finishes.
 - .7 Descriptive names of equipment.
 - .8 Mechanical and electrical characteristics when applicable.
 - .9 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.
 - .10 Calculated design loadings, and dimensions and material specifications for load-bearing members.
- .5 Include in shop drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.
- .6 Ensure shop drawings are of one uniform size and based on field measurements.

- .7 Before submitting to the Construction Manager, review all shop drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Trade Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Construction Manager's review of each shop drawing shall be indicated by stamp, date and signature of a qualified and responsible person possessing the appropriate authorization.
- .8 Be responsible for dimensions to be confirmed and correlated at the 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.
- .9 Submit shop drawings for the Construction Manager's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Trade Contractors. At the time of submission, notify the Construction Manager in writing of any deviations in the shop drawings from the requirements of the Contract Documents. The Trade Contractor will be held responsible for changes made from the Contract Documents which are not indicated or otherwise communicated in writing with the submission.
- .10 Drawings submitted by the Trade Contractor as required herein are the property of the Owner who may use and duplicate such drawings where required in association with the Work.
- .11 Submit shop drawings, as indicated in each section of the Work, signed and sealed by a licensed Professional Engineer registered in the place of the Work.
- .12 Shop drawings shall have distinct, uniform letters, numerals and line thicknesses that will ensure the production of clear legible prints and also facilitate microfilming and reduced reproduction.
- .13 Provide submissions in electronic Portable Document Format (PDF) format delivered via electronic means as directed by the Consultant.
- .14 Shop drawings shall contain the following identification:
 - .1 Project name and Contract number.
 - .2 Applicable 6-digit Contract Specification number describing the item.
 - .3 Location (unit, level, room number, etc.).
 - .4 Name of equipment or Product.
 - .5 Name of Trade Contractor, Subtrade or supplier.
 - .6 Signature of Trade Contractor certifying that Shop drawing is in conformance with Contract Documents.
 - .7 On submissions subsequent to the first, the following additional identification:
 - .1 The revision number.
 - .2 Identification of the item(s) revised.
- .15 Dimensions and designations of elements shall be shown in the same system of measurement used on the applicable Contract Drawings.

- .16 Construction Manager reserves the right to refuse acceptance of drawing submissions not meeting the above requirements.
- .17 Consultants review will be for conformity to the design intent and for general arrangement only and such review shall not relieve Trade Contractor of their responsibility for errors or omissions in shop drawings or of their responsibility for meeting all requirements of the Contract Documents unless a deviation on shop drawings has been approved in writing by Consultant.
- .18 Trade Contractor to make any changes in shop drawings which the Consultant may require consistent with the Contract Documents and re-submit unless otherwise directed. When re-submitting shop drawings, Trade Contractor to notify the Consultant in writing of any revisions other than those requested.
- .19 Only drawings noted for revision and resubmission need be resubmitted.
- .20 File one copy of each submitted shop drawing at the Site.

15 **CERTIFICATES**

- 15.1 Submit certificates that are required by authorities having jurisdiction or that are requested in the specification sections.
- 15.2 Clearly show on each certification the name and location of the Work, name and address of Trade Contractor, quantity and date of shipment and delivery and name of certifying company.
- 15.3 Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of acceptable testing laboratories to validate certificates.
- 15.4 Submit certificates in duplicate and signed by an authorized representative of the certifying company.

16 **EXTENDED WARRANTIES**

- 16.1 Submit extended warranties as requested in sections of the Specifications showing title and address of Contract, warranty commencement date and duration of warranty.
- 16.2 Extended warranties shall commence on termination of the standard warranty specified in the conditions of the contract and shall be an extension of these provisions. Clearly indicate what is being warranted and what remedial action is to be taken under the warranty. Ensure warranty bears the signature and seal of the Trade Contractor.
- 16.3 Submit each extended warranty on a form that is acceptable to the Owner and Construction Manager.

17 **REGULATORY REQUIREMENTS**

- 17.1 Provide Labour, Products, equipment, services, tools and Supervision to ensure that Work complies with minimum acceptable standards of materials and performance of Work in accordance with codes and standards referenced in the Specification.
- 17.2 Consider contract forms, codes, Specifications, standards, manuals, and installation and application instructions referred to in these specifications to be the latest published editions at the date of submission of the bid unless otherwise stated in the Specifications or otherwise required by the authorities having jurisdiction.

18 **CODES**

- 18.1 Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the reference standards specified.
- 18.2 In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

19 **STANDARDS**

- 19.1 Where a material is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacture which does meet the requirements of the standard, at no additional cost to the Owner.
- 19.2 Where no standard is referred to, provide materials, products and workmanship which meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Standards Board, Ontario Provincial Standard Specifications (OPSS), Ontario Provincial Standard Drawings (OPSD) and the applicable building code. References to "Measurement for Payment" and "Basis of Payment" in OPSS standard documents are not applicable to this Contract.
- 19.3 If there is question as to whether a material, product or system is in conformance with applicable standards, the Construction Manager reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with contract Documents or by the Trade Contractor in the event of non-conformance.
- 19.4 Where application, installation and workmanship standards are cited, it is intended that referenced standards form the basis for minimum requirements of the specified item and specifications supplement the standards unless specified otherwise.

19.5 Matters may be dealt with in part by these specifications which are also dealt with, under the same or similar headings in cited standard. It is not intended that these specifications take the place of the standards but supplement them, unless specified otherwise.

19.6 Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

20 FIRE RATINGS

20.1 Where a material, component or assembly is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:

- .1 Underwriters' Laboratories of Canada.
- .2 Underwriters' Laboratories Inc.
- .3 Factory Mutual Laboratories.
- .4 The National Research Council of Canada.
- .5 The National Board of Fire Underwriters.
- .6 Intertek Testing Services.

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

21 QUALITY CONTROL

21.1 Be responsible for inspection and testing as required by the Contract Documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional authority. Give the Construction Manager and Consultant timely notice of the readiness for inspection, date and time for such inspection for attendance by the Construction Manager and Consultant.

21.2 Verify by certification that specified products meet the requirements of reference standards specified in the applicable specification sections.

21.3 Conduct testing, balancing and adjusting of equipment and systems specified in applicable mechanical and electrical specifications sections by independent testing company.

22 **INSPECTION AND TESTING BY THE CONSTRUCTION MANAGER**

- 22.1 The Construction Manager may appoint an independent inspection and testing company to carry out inspection and testing of the Work for conformance to the Contract Documents. Such costs for inspection and testing will be paid through the Construction Manager. However, any additional inspection and testing due to non-conformance to the Contract Documents shall be at the Trade Contractor's expense.
- 22.2 Coordinate inspections and testing with inspection and testing company. Inspections and testing will be promptly made. Uncover for examination any Work covered up prior to inspection or without approval of the Construction Manager. Make good such Work at no cost to the Owner.
- 22.3 The Inspection and Testing Company may inspect and test Products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. The Consultant will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the Site as designated by the Consultant. Where inspection and testing is done either during manufacture, fabrication, or at Site, ensure that proper facilities and assistance are provided.

23 **INSPECTION AND TESTING**

- 23.1 Source and Field Quality Control specified in Other Sections:
- .1 This Section includes requirements for performance of inspection and testing specified under Source Quality Control and Field Quality Control in other Sections of the specifications.
- .2 Do not include in work of this Section responsibilities and procedures that relate solely to an inspection and testing company's functions that are specified in another Section which is paid through the Construction Manager. Such information is included in this Section for Trade Contractor's information only.
- 23.2 Do not limit responsibility for ensuring that products and execution of the work meet Contract requirements, and inspection and testing required to this end, to specified inspection and testing.

24 **QUALIFICATIONS OF INSPECTION AND TESTING COMPANIES**

- 24.1 Inspection and testing companies to be certified by the Standards Council of Canada (SCC) or Canadian Council of Independent Laboratories (CCIL).
- 24.2 Companies engaged for inspection and testing shall provide equipment, methods of recoding and evaluation, and knowledgeable personnel to conduct tests precisely as specified in reference standards.

24.3 If requested, submit affidavits and copies of certificates of calibration made by an accredited calibrator to verify that testing equipment was calibrated and its accuracy ensured within the previous twelve months.

25 **REFERENCE STANDARDS**

25.1 Perform inspection and testing in accordance with Standards quoted and as required by procedures described in specified reference standards that are applicable to the work being inspected and tested.

26 **RESPONSIBILITIES OF THE TRADE CONTRACTOR**

26.1 Be responsible for quality control methods and procedures to ensure performance of the work in accordance with the Contract Documents.

27 **RESPONSIBILITIES OF INSPECTION AND TESTING COMPANIES**

27.1 Determine from specifications and Drawings the extent of inspection and testing required for Work of the Contract. Trade Contractors shall notify Construction Manager of any omissions or discrepancies in the work inspected and/or tested.

27.2 Perform applicable inspection and testing described in the Specifications and as may be additionally directed.

27.3 Provide competent inspection and testing personnel when notified by the Trade Contractor that applicable work is proceeding. Inspection personnel shall cooperate with the Consultant, Construction Manager and Trade Contractor to expedite the Work.

27.4 Trade Contractors shall notify the Consultant and Construction Manager of deficiencies and irregularities in the Work immediately when they are observed in the course of inspection and testing.

27.5 Inspection and testing companies shall not perform or supervise any of the Trade Contractor's work, and shall not authorize:

.1 Performance of work that is not in strict accordance with the Contract Documents.

.2 Approval or acceptance of any part of the Work.

28 **INSPECTION AND TESTING PROCEDURES**

28.1 Perform specified inspection and testing only in accordance with specified reference standards, or as otherwise approved.

28.2 Observe and report on compliance of the Work to requirements of Contract Documents.

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- 28.3 Ensure that inspectors are on site or at fabricator's operations for full duration of critical operations, and as otherwise required to determine that the Work is being performed in accordance with the contract Documents.
- 28.4 Identify samples and sources of materials.
- 28.5 Review and report on progress of the work. Report on count of units fabricated and inspected at fabricator's operations.
- 28.6 Observe and report on conditions of significance to work in progress at time of inspection or at fabricator's operations. Include where applicable and if critical to the work in progress:
- .1 Time and date of inspection.
 - .2 Temperature of air, materials, and adjacent surfaces.
 - .3 Humidity of air, and moisture content of materials and adjacent materials.
 - .4 Presence of sunlight, wind, rain, snow and other weather conditions.
- 28.7 Include in reports all information critical to inspection and testing.
- 28.8 Ensure that only materials from the work and intended for use therein are tested.
- 28.9 Determine locations for work to be tested with Consultant.
- 29 **MOCK-UPS**
- 29.1 Mock-ups: Refer to Section 01 43 00 and individual Specification Sections for mock-up requirements applicable to Work of this Project.
- 30 **DEFECTS**
- 30.1 Defective products, materials and workmanship found at any time prior to Contract Completion will be rejected regardless of previous inspections, testing, and reviews of the Work. Inspections, testing, and reviews shall not relieve the Trade Contractor from their responsibility, but are a precaution against oversight or error. Remove and replace defective and rejected products, materials, systems, and workmanship. Be responsible for delays and expenses caused by rejection.
- 31 **SPECIFIED PRODUCTS**
- 31.1 Work of this Contract is based on Products specified by:
- .1 Manufacturer's catalogued trade names and/or;
 - .2 References to standards (i.e. CAN, CGSB, CSA, ASTM) or;

- .3 Prescriptive Specifications or;
 - .4 Performance Specifications.
- 31.2 When one or more manufacturer's trade name is specified for a Product, any one of the specified Products will be acceptable. Products by other manufacturers are subject to the Consultant's acceptance as an equivalent substitution in accordance with the specified requirements of substitutions.
- 31.3 When more than one manufacturer's catalogued trade name Product is specified along with a referenced standard, any one of the specified Products will be acceptable on condition the Product complies with the referenced standard.
- 31.4 When a Product is specified by reference to a standard only, the Trade Contractor may select any Product that meets or exceeds the specified standard for the intended purpose. The onus shall be on the Trade Contractor to establish that such Products meet the reference standard requirements. Products exceeding minimum requirements established by reference standards will be accepted for the Work if such Products are compatible with the Work with which they are incorporated.
- 31.5 When a Product is specified by prescriptive or performance Specification, any Product meeting or exceeding the Specification will be accepted.
- 31.6 When a Product is specified by reference to a standard or by prescriptive or performance Specification, upon request of the Construction Manager, obtain from the manufacturer, an independent testing laboratory report showing that the Product meets or exceeds the specified requirements.
- 31.7 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

32 **SUBSTITUTIONS**

- 32.1 Requests for substitutions will not be accepted prior to the Notification of Award. Product substitutions will be considered by the Consultant provided that:
- .1 Proposed Product substitutions have been investigated and complete data are submitted in accordance with the Specifications.
 - .2 Data relating to changes in the Contract Schedule, if any, and relation to other Work have been submitted.
 - .3 Same warranty is given for the substitution as for the original Product specified.
 - .4 All claims are waived for additional costs related to the substitution which may subsequently arise.

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- .5 Installation of the accepted substitution is co-ordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Trade Contractor.
- 32.2 Substitutions to methods or process described in the Specifications or drawings, may be proposed for the consideration of the Consultant. Ensure that such substitutions are in accordance with the following requirements:
- .1 Time spent by the Consultant in evaluating the substitution shall not be the basis for a claim by the Trade Contractor for extensions to the Contract Time.
- .2 Clearly indicate how the proposed substitutions would be advantageous to the Owner or in the opinion of the Trade Contractor would improve the operation of the installation.
- .3 Be responsible for substitutions to methods or processes concerning such Work and ensure that the warranty covering all parts of the Work will not be affected.
- .4 Cost of all changes in the work of Other Trade Contractors, necessitated by the substituted methods or processes, if accepted, is borne by the Trade Contractor.
- .5 Substituted methods or processes fit into space allotted for the specified methods or processes. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Trade Contractor.
- 32.3 Substitutions will not be considered if:
- .1 They are indicated or implied on shop drawings or Product data without formal request.
- .2 Acceptance will require substantial revision of the Specifications and Drawings.
- 32.4 Do not Provide substitute Products or methods or processes into the Work unless such substitutions have been specifically approved for the Work by the Consultant.
- 32.5 Approved substituted Products shall be subject to the Consultant's inspection and testing procedures.
- 32.6 Contract Price will be adjusted accordingly to any and all credits arising from the substitutions mentioned above.
- 33 **APPROVAL OF PRODUCTS AND INSTALLATION METHODS**
- 33.1 Wherever in the Specifications it is specified that Products and installation methods shall meet approval of Authorities having Jurisdiction, underwriters, the Construction Manager, or others, such approval shall be in writing.

34 **PRODUCT AVAILABILITY**

- 34.1 If delays in supply of Products are foreseeable, notify the Construction Manager of such, in order that remedial action may be authorized in ample time to prevent delay in performance of Work.
- 34.2 In the event of failure to notify the Construction Manager at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Construction Manager reserves the right to direct the Trade Contractor to take the following measures at no increase in Contract Price:
- .1 Substitute more readily available Products of similar or better quality and character, or
 - .2 Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

35 **TRADEMARKS AND LABELS**

- 35.1 Permanent labels, trademarks and nameplates on Products are not acceptable in the finished Work, except where required by authorities having jurisdiction, for operating instructions, or when located in service rooms.
- 35.2 Remove trademarks and labels by grinding, if necessary, painting out where the particular surface is being painted, or if on plated parts, replace with new plain plated or non-ferrous metal parts.

36 **DELIVERY, STORAGE, HANDLING AND PROTECTION**

- 36.1 Be responsible for handling and delivery of Products. Protect Products from damage during handling, storage and installation. Deliver store and handle items in accordance with manufacturer's instructions and as specified. Be responsible for all costs of delivery, loading and off-loading, and for transportation back to its origin for correction, if required, due to damage or defect. Reject materials and Products delivered to the Site which are damaged.
- 36.2 Manufacture, pack, ship, deliver, and handle Products so that no damage occurs to structural qualities and finish appearance, nor in any other way which is detrimental to their function and appearance.
- 36.3 Ensure that Products, while transported, are not exposed to an environment which would increase their moisture content beyond the maximum specified.
- 36.4 Organize delivery of materials, Products and equipment to, and removal of debris and equipment from, the site and surrounding property.

- 36.5 Schedule early delivery of Products to enable Work to be executed without delay. Before delivery, arrange for receiving at the Place of the Work.
- 36.6 Coordinate mechanical and electrical equipment and apparatus deliveries with the manufacturer's and suppliers such that equipment and apparatus is delivered to the site when it is required, or so that it can be stored within the building and protected from the elements.
- 36.7 Shop assemble work for delivery to Site in size easily handled and to ensure passage through building openings.
- 36.8 Deliver packaged Products, in original unopened wrapping or containers, with manufacturer's seals and labels intact.
- 36.9 Label packaged products to describe contents, quantity, and other information as specified.
- 36.10 Labels attesting that materials conform to specified reference standards will be acceptable as verification that contents meet specified requirements. In the absence of labels, submit affidavits to validate conformance of Product to reference standards, as requested by the Construction Manager.
- 36.11 Label fire-rated Products to indicate Underwriters' Laboratories of Canada approval.
- 36.12 Handle and store materials and Products in such a manner that no damage is caused to the materials and Products, the Work, other building components, assemblies, other products, the structure, the Site and surrounding property.
- 36.13 Allocate an area within the limits of the Work acceptable to the Owner for storage of Products brought to the Site. Keep storage area tidy at all times and do not use other parts of the property for storage. Arrange and pay for off-site storage when required.
- 36.14 Locate products on Site in a manner to cause minimal interference with the Work.
- 36.15 Store Products off the ground, in a manner to prevent damage, adulteration, deterioration and soiling of Products in accordance with manufacturer's instructions when applicable.
- 36.16 Store packaged or bundled Products in original and undamaged condition complete with written application instructions. Keep manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.
- 36.17 Store Products subject to damage from weather in weatherproof enclosures.
- 36.18 Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous material in bulk within the Work.

- 36.19 Make good or replace damaged materials to the satisfaction of the Construction Manager.
- 36.20 Hazardous Materials Information:
- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) in accordance with jurisdictional authorities.
 - .2 Deliver copies of Material Safety Data Sheets (MSDS) to the Construction Manager on all Products intended for use in the Work and designated as a "controlled product."

37 **MANUFACTURER'S INSTRUCTIONS**

- 37.1 Unless otherwise indicated in the Specifications, fabricate, install, apply, connect, erect, use, clean, and condition Products in accordance with manufacturer's instructions except where more stringent requirements are specified. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.
- 37.2 Notify the Construction Manager in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Construction Manager may establish the course of action. If requested, make a copy of those instructions available at the Site.
- 37.3 In cases of improper installation or erection of Products, due to failure in complying with these requirements, the Construction Manager may direct removal and re-installation at no increase in Contract Price.

38 **WORKMANSHIP**

- 38.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Construction Manager if required Work is such as to make it impractical to produce required results.
- 38.2 Do not employ any unfit person or anyone unskilled in their required duties. The Construction Manager reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.
- 38.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Construction Manager, whose decision is final.
- 38.4 Give particular attention to finished dimensions and elevations of the Work. Make finished Work fit indicated spaces accurately. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.

- 38.5 Keep surfaces, on which finished materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.
- 38.6 Enforce fire prevention methods at Site. Do not permit fires, open flame heating devices or accumulation or debris. Use flammable materials only if all safety precautions are taken. Provide and maintain in working order ULC labelled fire extinguishers of types suitable for fire hazard in each case, and locate them in prominent location and to approval of jurisdictional authorities.
- 38.7 Where flammable materials are being applied, ensure that adequate ventilation is provided, spark-proof equipment is used, and smoking and open flames are prohibited.
- 39 **DIMENSIONS**
- 39.1 Check all dimensions at the Site before fabrication and installation commences and report discrepancies to the Construction Manager.
- 39.2 Where dimensions are not available before fabrication commences, ensure that dimensions required are agreed upon between the parties concerned.
- 39.3 Prior to commencing work, ensure that clearances required by jurisdictional authorities can be maintained.
- 39.4 Wall thicknesses and openings shown on the drawings may be nominal only; ascertain actual sizes at the Site.
- 39.5 Verify dimensions of shop fabricated portions of the Work at the Site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra expense by reason of non-compliance with this requirement.
- 39.6 Fabricate and erect manufactured items, shop fabricated items, and items fabricated on or off site, to suit site dimensions and site conditions.
- 39.7 In areas where equipment is to be installed, check dimensional data on equipment to ensure that area and equipment dimensions are compatible with necessary access and clearance provided. Ensure that equipment supplied is dimensionally suitable for space provided.
- 39.8 Leave areas clear where space is indicated to be reserved for future equipment, including access to such future equipment.
- 39.9 Whether shown on the Drawings or not, leave adequate space and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils and tubes.

40 **TOLERANCES FOR INSTALLATION OF WORK**

- 40.1 Unless specifically indicated otherwise, Work shall be installed plumb, level, square and straight.
- 40.2 Unless acceptable tolerances are otherwise specified in specification sections or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:
- .1 "Plumb and level" shall mean plumb or level within 1 mm in 1 m.
 - .2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
 - .3 "Straight" shall mean within 1 mm under a 1 m long straightedge.
 - .4 "Flush" shall mean within:
 - .1 6 mm for exterior concrete, masonry, and paving materials.
 - .2 1 mm for interior concrete, masonry, tile and similar surfaces.
 - .3 0.5 mm for other interior surfaces.
- 40.3 Allowable tolerances shall not be cumulative.

41 **EXPANSION, CONTRACTION, AND DEFLECTION**

- 41.1 Conform to manufacturer's recommended installation temperatures. If items, components, assemblies, systems, and finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and Construction Manager. Repair all resulting damage should expansion provisions provide inadequate.
- 41.2 Make provisions for expansion and contraction due to temperature changes within components, Products and assemblies, and between adjacent components, Products and assemblies, and due to building movements including but not limited to creep, column shortening, deflection, sway and twist. Ensure provisions for expansion, contraction and building movements prevent damages from occurring to and within components, Products and assemblies.
- 41.3 Make adequate allowance at wall and partition heads for deflection of the structure above. Determine requirements from Construction Manager where additional information is required. Where partitions butt to underside of floor assembly, or structural framing, the clearance shall be based on the span of the members supporting the floor or structural framing. In making such allowance use methods which maintain the integrity of the wall or partition as a sound, and/or fire barrier.
- 41.4 Make provisions in pipes, plenums, ducts and vessels containing air and fluids as is necessary to prevent damage due to fluid and air induced pressure, surges and vibrations, to pipes, plenums, ducts and vessels and to adjacent components, assemblies and construction to which pipes, ducts, plenums and vessels are attached or pass through.

42 **DIELECTRIC SEPARATION**

42.1 Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminum in contact with alkaline materials such as contained in cementitious materials.

43 **FASTENINGS**

43.1 Include in the work of each section necessary fastenings, anchors, inserts, attachment accessories, and adhesives. Where installation of devices is in work or other sections, deliver and locate devices in ample time for installation.

43.2 Do not install fibre, plastic or wood plugs or blocking for fastenings in masonry, concrete, or metal construction, unless specified or indicated on drawings.

43.3 Install work with fastenings or adhesives in sufficient quantity to ensure permanent secure anchorage of materials, construction, components and equipment under static conditions, and to resist building thermal movement, creep and vibration.

43.4 Provide metal fastenings and accessories in same material, texture, colour, sheen and finish as metal on which they occur, unless indicated otherwise.

43.5 Prevent electrolytic action between dissimilar metals and materials.

43.6 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior Work, and where attached to, or contained within, exterior walls and slabs, unless stainless steel or other material is specified. Leave steel anchors bare where cast in concrete.

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

43.8 Conceal fasteners where indicated. Keep exposed fastenings to a minimum, space evenly and in an organized symmetrical pattern.

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

44 **ADJUSTING**

44.1 Ensure that all components of assemblies fit snugly, accurately and in true planes, and that moving parts operate positively and freely, without binding and scraping.

44.2 Verify that work functions properly and adjust it accordingly to ensure satisfactory operation. Lubricate Products as recommended by manufacturer.

45 **LAYOUT AND SURVEY**

- 45.1 Existing grades, lines, and site conditions shown on drawings were taken from survey information established by persons engaged directly by the Owner. The accuracy of survey information is not the Construction Manager's responsibility. The Owner will establish location of property lines.
- 45.2 Be responsible for setting out the Work. Prior to setting out the Work, verify dimensions and elevations shown on the Contract Documents and report to the Construction Manager any unsatisfactory conditions that may adversely affect the proper completion of the Work.
- 45.3 Set up and maintain permanent reference points and be responsible for the accuracy of such reference points. Establish lines and levels required for the performance of the Work.
- 45.4 Accurately set out the Work from levels and lines. Where Work of this Contract is dependent upon grades and elevations of existing structures or facilities, such grades or elevations shall take precedence over those determined by reference to established elevations. Advise the Construction Manager of any discrepancies.
- 45.5 During any activity of the Work, layout and check all features, including but not limited to the following:
- .1 Establish and maintain temporary bench marks set required to perform the Work.
 - .2 Provide general dimensions, lines and elevations required to perform the Work.
- 45.6 Examine, preserve and protect established bench marks. Re-established a lost or displaced bench mark by a Land Surveyor licensed to practice in the place of Work at no cost to the Owner. Accept responsibility for setting out the Work.
- 45.7 In the event of a discrepancy between the Owner and the Trade Contractor regarding horizontal and/or vertical alignment conditions, that are beyond allowable specified tolerance, the Owner may engage the services of an independent Land Surveyor. The surveyor shall investigate the disputed condition and the results of the independent investigation shall determine the bearer of costs for this service, being either the Owner or the Trade Contractor.
- 45.8 If the Trade Contractor is found to be in error, all costs incurred to correct the condition shall be assumed by the Trade Contractor.

46 **GARBAGE DISPOSAL AND CLEANUP**

- 46.1 Comply with requirements of authorities having jurisdiction.
- 46.2 Prepare and submit waste audit and waste reduction plan in accordance with Ontario Regulation 102/94 Waste Audits and Waste Reduction Workplans.

- 46.3 Prepare and submit source separation plan in accordance with Ontario Regulation 103/94 Industrial, Commercial and Institutional Source Separation Programs.
- 46.4 Deliver to nearest appropriate depot all materials accepted for recycling by the region or municipality having jurisdiction over the Place of Work, including but not limited to cardboard, paper, plastic, aluminum, steel, and glass. Deliver to nearest appropriate depot all scrap and excess gypsum wallboard for recycling of this material. Pay all costs for this work.
- 46.5 Trade Contractors shall provide waste containers for the disposal of all waste materials resulting from performance of their work.
- 46.6 No hazardous or contaminated waste material shall be placed in owner's or Construction Manager's waste containers and Trade Contractors shall make their own arrangements for the disposal off site of any such material resulting from performance of their work.
- 46.7 Trade Contractors shall remove all regular waste material and debris from their work areas and deposit in the waste containers at the end of each working day. Any clean up work not performed as requested will be carried out by the Construction Manager with all resultant costs being charged to the Trade Contractor.
- 47 **CLEANING**
- 47.1 Ensure that splatters, droppings, soil, labels, and debris are removed from surfaces to receive finishes, before they set up. Leave work and adjacent finished work in new condition.
- 47.2 Maintain premises "broom clean" during progress of the work.
- 47.3 Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Provide containers in which to collect waste material and debris.
- 47.4 Use cleaning materials recommended for the purpose by both the manufacturer of Products forming surfaces to be cleaned and cleaning material.
- 47.5 Conduct cleaning operation in compliance with the occupational health and safety regulations, with local ordinances and anti-pollution laws.
- 47.6 Remove grease, dust, dirt, stains, labels, fingerprints, oxidization, excess adhesive and other contaminants from interior and exterior surfaces including glass, plastic laminate, plastic and other Products. Clean lighting components including lighting reflectors, lenses and other lighting surfaces.
- 47.7 When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work.
- 47.8 Leave Work in a broom clean condition before the inspection process commences.

- 47.9 Broom clean and wash exterior walks, steps and surfaces.
- 47.10 Rake clean exterior grassed areas and planting beds.
- 47.11 Remove dust, dirt and other foreign materials from exposed surfaces.
- 47.12 Vacuum clean and dust building interiors, including grilles, louvres and screens.
- 47.13 Remove stains, spots, marks and dirt from decorative Work, electrical and mechanical fixtures, floors and walls.

48 **DEMONSTRATION AND INSPECTION OF PRODUCTS AND SYSTEMS**

- 48.1 Arrange for a demonstration of systems and operating Products upon the 100% completion of their installation and prior to certification for Substantial Performance.
- 48.2 Include in the arrangements for the attendance of the Construction Manager, Owner, jurisdictional authorities, and personnel assigned by the Owner for the operation of the systems and/or Products.
- 48.3 Demonstrations shall be conducted by the Subtrade responsible for the installation of the systems and/or Product, assisted by representatives of the manufacturer or supplier. All personnel conducting the demonstration shall be completely knowledgeable of all conditions of the operating, functioning and maintenance of the systems and/or Products.
- 48.4 Owner's representative will acknowledge the successful completion of each demonstration on a form provided by the Trade Contractor. The form shall be agreed to by the Owner, Construction Manager and Trade Contractor prior to demonstration and testing.
- 48.5 Submit copies of letters from manufacturers of Systems and/or Products before making application for certificate of Substantial Performance to verify that the Products has been installed and connected correctly, and that it is operating in a satisfactory manner. The certification shall be based upon inspection and testing of the Products by competent technical personnel. Include in letter of certification the names of personnel conducting the testing and inspection, the methods of inspection utilized, and the location in the building of the Products certified.
- 48.6 Following submission of letters of certification and their acceptance by the Owner, the owner shall have the right to use the Products on a trial basis and for instructing their personnel in its use.

49 FINAL INSPECTIONS AND CLOSE OUT

- 49.1 Submit proposed closeout procedures and schedule of inspection to Construction Manager for approval before final demonstrations and inspections commence.
- 49.2 Arrange for, conduct and document final demonstrations, inspections, close-out and take-over at completion of the Work to the satisfaction of the Construction Manager.

50 OPERATION AND MAINTENANCE MANUALS

- 50.1 Hand over to the Construction Manager four (4) copies of a comprehensive operations and maintenance manual and material suitable for the Owner's maintenance employees. Manuals shall cover all Products supplied and installed under the Contract.
- 50.2 Submit draft of the operation and maintenance manuals for the Construction Manager's review at least 15 days before testing systems and equipment. Incorporate alterations and additions, as found to be necessary during testing, and prepare the final version of the manual from the corrected draft.
- 50.3 Submit final version of operation and maintenance manuals prior to Contract Completion.
- 50.4 Testing of systems and equipment will not be deemed to be complete until the requisite number of copies of the final version of the manuals has been handed over to the Construction Manager.
- 50.5 If standard literature is incorporated into the operations and maintenance manual, any irrelevant information shall be deleted, or suitably noted.
- 50.6 The manuals shall have sufficient detail in order that the Owner can totally maintain the equipment without outside help.
- 50.7 Submit all material in English.
- 50.8 Format:
 - .1 Organize data in the form of an instructional manual.
 - .2 Binders: Commercial quality, 219 x 279 mm, maximum "D" ring size.
 - .3 When multiple binders are used, correlate data into related consistent groupings.
 - .4 Cover: Identify each binder with type or printed title "Operation and Maintenance Manul"; list title of Contract, identify subject matter of contents.
 - .5 Arrange content by systems or process flow, under Section numbers and sequence of Table of Contents.

- .6 Provide tabbed fly leaf for each separate Product and system, with typed description of Product and major component parts of equipment.
 - .7 Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
 - .8 Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- 50.9 Contents:
- .1 Operation and maintenance manuals shall contain the following minimum information and data:
 - .1 Table of contents: Provide title of Contract; names, addresses, and telephone numbers of Construction Managers and Trade Contractor with name of responsible parties; schedule of Products and systems, indexed to content of the volume.
 - .2 For each Product or system: List names, addresses and telephone numbers of Subtrades, suppliers and serviced representatives, including local source of replacement supplies and parts including telephone numbers.
 - .3 Warranties: Warranties are between the Trade Contractor and Owner. Warranties shall include, as a minimum:
 - .1 Description of warranty coverage.
 - .2 Date warranty starts (being date of Substantial Performance of the Work).
 - .3 Date warranty expires.
 - .4 Contact name, address and phone number (the Trade Contractor shall also be responsible for advising the Owner of changes in contact information during the warranty period).
 - .5 Equipment and components performance curves.
 - .6 Hydro certificates.
 - .4 Reports: For each Product or system provide the following:
 - .1 Manufacturer's certified reports .
 - .2 Factory test reports.
 - .3 Field testing reports.
 - .5 Details of design, construction and/or fabrication features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.
 - .6 Technical data, Product data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists.
 - .7 Schematics, interconnection lists: Manuals shall be complete with schematic and wiring diagrams, wiring interconnection lists and diagrams fully cross referenced and coordinated, printed circuit board layouts including the component identification, component parts list with electronic substitution equivalent. Provide cross referenced components lists and sequence of operations.
 - .8 Trouble shooting and fault location guide: Instructions to facilitate quick return of malfunctioning equipment to operation.

- .9 Routine servicing and preventative maintenance schedule for Products and/or estimated hours required for routine servicing and preventative maintenance tasks.
- .10 List of recommended spare parts and recommended quantity of each item to be stocked based on spare part availability and re-order time.
- .11 Complete set of reviewed shop drawings.
- .12 Product data: Mark each sheet to clearly identify specific Products and component parts, and data applicable to installation; delete inapplicable information.
- .13 Drawings: Supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams and as required in the Specifications.
- .14 Typed text: As required to supplement Product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions and as required in the Specification.

50.10 Drawings

- .1 Prepare all required drawings on CAD, using AutoCAD.
- .2 Prepare CAD drawings to meet the requirements of the Owners or Construction Manager's CAD Standards and Procedures.
- .3 Supply and hand over to the Construction Manager, one original photographic reproduction, for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.
- .4 The final size of drawings shall be 560 mm x 860 mm. Half size reproductions (280 mm x 430 mm) shall also be provided.
- .5 Prior to Contract Completion, supply and hand over to the Construction Manager, one complete set of CAD Drawing Files in Autocad format for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

51 **PROGRESS RECORDS**

- 51.1 Maintain on site, permanent written records of daily progress of the Work. Records shall be open to review by Consultant and Owner at all times.
- 51.2 Records shall show dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to number of employees of various trades and type and quantity of equipment employed daily, temperature, protection methods and other such data shall be noted.

52 **AS-BUILT DRAWINGS**

- 52.1 Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Construction Manager.
- 52.2 Maintain as-built drawings up to date as Work progresses. Status of maintained as-built drawings may be considered as a condition for validation of applications for payment.
- 52.3 Identify each as-built drawing as "Contract As-Built Copy" and maintain the as-built drawings in good condition. Make as-built drawings available to the Construction Manager at all times.
- 52.4 As-built drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.
- 52.5 As-built drawings shall be signed and dated by Trade Contractor.
- 52.6 Submit as-built drawing to Construction Manager for review and make corrections as directed by Construction Manager.
- 52.7 Record accurately all deviations in the Work.
- 52.8 Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.
- 52.9 Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.
- 52.10 Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in unaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.
- 52.11 Accurately record any components which will be in inaccessible locations for Construction Manager's review before the component is covered, or buried, or made inaccessible.

END OF SECTION