TETRA TECH

QUOTE

Building Services

■ ■ ■

SCC
NEW SYSTEM OF CLIMATISATION

■ ■ ■

Issued of tender

Y/Ref. : 377-3101

O/Ref. : 45504TT

■ ■ ■

February 17, 2022

SCC

NEW SYSTEM OF CLIMATISATION

Quote of mechanical and electricity

Issued for tender

Your reference : 377-3101
Our reference: 45504TT

2500, Daniel-Johnson blvd, office 810
Laval, Québec H7T 2P6
Phone: 450 687-4440
Fax: 450 687-3755

Approuved by:

Guillaume Lapointe, Eng. PA LEED BD+C
Mechancial

2022-02-17

Franck Koffi, Eng.
Electricity

February 17, 2022

TABLE OF CONTENTS

1.0 SECTION 01 11 00 – SUMMARY OF WORK

1.01 DEFINITIONS

A. The terms “Architect” and “Engineer” refer to the firms stipulated and their duly appointed representatives. The term “Departmental Representative” refers to the Owner or its duly designated representative.

B. The term “Departmental Representative” refers to Correctional Service Canada

C. The term “Engineer” refers to Tetra Tech .

1.02 ORGANIZATION AND SUBMISSIONS OF BIDS

A. General Contactor

1. The following specialized contractor acts as a general contractor :

a. Specialized contractor responsible for work on the aeraulic and related systems of Division 23 – Heating, Ventilation and Air Conditioning (HVAC).

2. Notwithstanding the organization indicated below for the submission of bids, the general contractor is responsible for ensuring that it receives, from its potential subcontractors, complete bids covering all work to be performed. Any work not included in a subcontractor's submission must be performed directly by the general contractor. The scheduling and assembly of the Divisions and Sections of the Quotation is not intended to distribute the work among the subcontractors, a task which is the responsibility of the general contractor. The Engineer assumes no responsibility for incomplete or redundant submissions.

B. Unless otherwise specified by the General Contractor, submit bids by organizing and identifying them as follows :

1. Aeraulic Networks: Submission for work on aeraulic and related networks: includes but is not limited to:

a. The drawings and general conditions of the contract, including the general clauses and the special clauses, as well as the Specification Sections of Division 01 – General Requirements.

b. All work in Division 22 - Plumbing.

c. All work of Division 23 Heating, Ventilation and Air Conditioning (HVAC) concerning aeraulic and related systems.

d. All work in Division 25 – Built-in automation.

2. Electricity, Communications, Electronic Safety and Security: Submission for work related to electricity, communications, electronic safety and security: includes but is not limited to:

a. The drawings and general conditions of the contract, including the general clauses and the special clauses, as well as the Specification Sections of Division 01 – General Requirements.

b. All work in Division 26- Electricity

3. General Work: Submission for all other work: includes but is not limited to:

a. The drawings and general conditions of the contract, including the general clauses and the special clauses, as well as the Specification Sections of Division 01 – General Requirements.

b. Work not included in the above submissions.

c. Work performed directly by the general contractor.

1.04 INTERPRETATION OF SPECIFICATIONS AND DRAWINGS

A. The specifications and drawings complement each other. Any error, inaccuracy or contradiction subject to interpretation shall be sent to the professional to obtain a final and authoritative interpretation. The Engineer reserves the right to interpret their documents.

B. Precedence

1. In case of contradiction or discrepancy between the various documents, the order of priority is as follows. The first document takes precedence over the second and so on:
   a. Contract
   b. Addenda
   c. General Contract Conditions
   d. Supplementary General Conditions
   e. Specifications
   f. Plans
2. Furthermore, in the event of a contradiction or discrepancy in the plans or specifications, the order of priority is as follows:
   a. Numerical dimensions indicated on the drawings take precedence, even if they differ from the dimensions taken to scale.
   b. Larger scale drawings take precedence over smaller scale drawings.
   c. Dimensions take precedence over scale measurements.
   d. The detail plans take precedence over the layout plans.
   e. In the event of discrepancy between International System (SI) and Imperial System units, the most stringent take precedence.
3. The latest edition of two documents of the same type takes precedence.

C. No scaled measurement taken from the plans may be used to interpret construction dimensions.

D. Mechanical and electrical structure plans do not indicate all structural details; any information containing exact building dimensions will be based on the dimensions indicated on the architectural plans or on measurements taken from or in the building.

E. These plans indicate, from a general perspective, the position and path that the pipes, ducts, etc. to be installed must follow. When their location is not indicated on the drawings or is represented schematically, install them so as to minimize encroachment on the space through which they travel.

F. Space reserved on the plans for future fixtures or equipment shall be left free and, if necessary, install all piping and other related equipment to allow for the future connection of such fixtures or equipment.

2.0 SECTION 01 14 00 – WORK RESTRICTIONS

2.01 WORKING HOURS

A. Refer to the general contract conditions for requirements of this project related to working hours and provide a bid price based on those requirements.

2.02 WORKER ACCESS

A. Contractor employees will only have access to the work site.

B. Contractor employees are strictly prohibited from accessing areas other than those where work is being performed.

2.03 WORK SUPERVISION AND WORK SITE ACCESS

A. The Engineer, Architect and Departmental Representative or their duly appointed representatives shall have the right to access the work site and work at all times, whether at the work preparation or execution stage.

B. Facilitate access for these professionals so that they can perform any inspections or checks necessary.

C. Ensure all equipment required to access the equipment to be verified is available for the Engineer, Architect and Departmental Representative as necessary. Such equipment may include, without being limited to, ladders, stepladders, safe scaffolding, forklifts with elevated platforms that meet CSST standards, etc.

D. Ensure a staff member is available to the Engineer, Architect, or Departmental Representative when required to, among other things:

1. Transport and place required ladders and stepladders safely.
2. Provide access to certain sections of the work site that may be locked.
3. Drive and operate a forklift equipped with an elevated platform.

2.04 RIGHT TO REFUSE LABOUR

A. Provide a high-quality, qualified and competent workforce for the duration of the work.

B. The Departmental Representative, Architect or Engineer may, at any time, request replacement of any person working on the site who is not qualified to perform their duties.

C. The Departmental Representative, Architect or Engineer may, at any time, request replacement of any person who:

1. proves to be incompetent;
2. fails to comply with work site safety rules;

3. fails to meet the Departmental Representative's requirements;
4. acts in a manner that is unsafe for themselves or others;
5. behaves confrontationally and is a threat to others.

D. Any request by the Departmental Representative, Architect or Engineer to replace a worker is final and may not be appealed.

E. If certain persons must be replaced, replacements are subject to written approval from the Departmental Representative, after the Contractor has produced, to the Departmental Representative's satisfaction, information proving the replacements' competence to perform the work. Such replacement proceedings, including time taken to establish the competence of replacements, may not be used as justification for requests for extensions to deadlines to execute the Work.

3.0 SECTION 01 25 00 – SUBSTITUTION PROCEDURES

3.01 REQUEST FOR EQUIVALENCE AND SUBSTITUTION (ACCEPTABLE PRODUCTS)

A. The requirements set out hereafter are intended to establish the level of quality for project materials and services, and to prevent bargaining practices for alternatives after the contract has been awarded, which could ultimately be to the detriment of the Departmental Representative.

B. Furthermore, the intent is not to eliminate honest competition in bidding for substitute materials and products.

C. The Contractor shall establish its bid price based only on the fixtures, equipment, materials and products specified, as well as on the execution methods outlined in the bid package.

D. For the purposes of this contract, "Acceptable Product(s)" means that the item specified serves as the criterion for material performance, quality and workmanship.

E. Manufacturers' names, catalogue numbers, trade names and trade marks are used to specify the type and quality of materials and products required.

F. Where a manufacturer's name or trademark is followed by the word "only," only that manufacturer is to be considered without any possibility of substitution.

G. Where one, two or more manufacturers' names or trademarks are specified, the bidder may select any of them, without having to submit a request for substitution.

H. Notify the Engineer immediately if products, equipment or materials are discontinued. When that is the case, the Engineer will provide a new list of acceptable products to use.

I. If the Contractor wishes to use materials it deems "equivalent" to those described with a trademark, a request for equivalence shall be submitted with the bid, indicating the difference in price that there would be if the substitution were accepted.

J. Substitutions to specified manufacturer or trademark names may be proposed under the following conditions:

1. The bid price is based on the products specified and the methods of execution stipulated in the bid documents.
2. Substitutions shall meet all specified requirements (characteristics, performance, compliance with standards, etc.).
3. Assume costs for all additional work and adjustments that result from the acceptance of the proposed substitutions, including costs for other trades.
4. Requests for substitutions must be submitted on the Substitution Request Form and attached to the bid form. (Do not attach to the bid form if no substitutions are requested.) On the Substitution Request Form, stipulate the specification section and article number, the manufacturer and model proposed, as well as the variation in cost that would apply to the said substitution.
5. Any request for substitution that is not submitted on the Substitution Request Form and attached to the bid will be denied.
6. No substitutions submitted after the bids have been submitted will be accepted.

K. Substitution requests will only be considered after contract award. Consequently, the Contractor will have thirty (30) days after contract award to demonstrate equivalency.

L. Any material or product proposed as an equivalent shall be considered as non-equivalent until the Engineer issues a certificate of equivalence.

M. No request for substitution will be considered if received after the bid opening, unless the specified material or product is no longer available. As a result, no substitutions will be considered after the contract is signed, unless there is a major reason as determined by the Engineer.

3.02 PROOF OF EQUIVALENCE

A. As proof of equivalence, provide all documentation showing:

1. Construction
2. Characteristics
3. Performance
4. Performance curves
5. Fabrication and finishes
6. Size and weight
7. Overall dimensions
8. Compliance with standards
9. Maintenance
10. All other relevant information
11. Discrepancies with bid package requirements
12. Delivery time frame
13. Existence of similar and approved fixtures

14. Difference in cost (supply and installation)

B. The Engineer's decision to accept or deny requests for substitution shall be final.

C. In no case does the Departmental Representative commit to accepting an equivalence even though proof of equivalence has been established.

D. If the Contractor substitutes equipment or materials without prior authorization, the substituted material shall be automatically rejected. Furthermore, the Contractor shall absorb all costs to replace equipment and materials substituted by the specified product, and includes all costs relating to connection, supports, electricity, control, etc.

SUBSTITUTION REQUEST FORM

PROJECT:

BIDDER:

DATE:

SECTION _____ ARTICLE No.	MANUFACTURER PROPOSED	MODEL	CHANGE IN BID PRICE	
			LESS	MORE

NOTES:

1. We agree to provide proof of equivalence for each substitution proposed.
2. Our bid is based on the products and execution methods set forth in the bid documents, and not on the aforementioned substitutions.
3. In the event that the Departmental Representative denies any or all of the proposed substitutions, we agree to use the acceptable products specified.
4. Please find _____ Request for Equivalence Forms, including this one, attached to the bid form.

Bidder's signature:

4.0 SECTION 01 26 00 – CONTRACT AMENDMENT PROCEDURES

4.01 NON-CONTRACT WORK AND MODIFICATIONS

A. No modifications to the plans and specifications will be permitted without submitting a written request to the Engineer or Departmental Representative.

B. If, during construction, the Contractor is advised to make a change that it deems would entitle it to additional compensation, the Contractor shall notify the Engineer and Departmental Representative in writing, and shall not proceed with the change until it receives written authorization.

C. No additional compensation will be paid to the Contractor for work other than that stipulated in the Contract, unless written authorization from the Departmental Representative was obtained beforehand.

4.02 EVALUATION OF WORK CHANGE ORDERS

A. The following information complements the “Evaluation of work change orders” clause in the General Conditions.

B. The 15% or 10% proportion for general contractor overhead and the 15% proportion for subcontractor overhead are always calculated before taxes and include the following:

1. Manager and/or superintendent salaries
2. Estimate and document preparation costs
3. Administrative costs
4. Stationery, stamps, phone and head office expenses
5. General head office expenses
6. Accounting costs
7. Social security taxes
8. Travel
9. Bonuses and fringe benefits
10. Profits and administration
11. Rental of a site office
12. Telephone
13. Insurance premium
14. Additional premium for warranty
15. Power (consumption)
16. Temporary electricity
17. Small tools
18. Financing
19. Cleaning

20. Miscellaneous (shop drawings, samples, tests, tracing, etc.)

5.0 SECTION 01 29 00.03 – PAYMENT PROCEDURES – ADDITIONAL REQUIREMENTS

5.01 COST BREAKDOWN

A. Before requesting the first progress payment, submit a detailed cost breakdown along with the overall contract amount. Once approved by the Engineer, the cost breakdown will be used as the basis for calculating progress payments.

5.02 RELEASES

A. With each request for payment, the Contractor shall produce a release signed by the subcontractor(s) and material supplier(s) identified by the Departmental Representative, Construction Manager or Engineer, certifying that the Contractor has paid amounts due to them in full.

5.03 REQUEST FOR FINAL PAYMENT AND CLOSEOUT SUBMITTALS

A. The Contractor's requests for payment shall not exceed 90% of the contract value until the Engineer has received and reviewed all closeout submittals, as stipulated in the various specification sections.

6.0 SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

6.03 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction activities defined in the various specification sections to ensure efficient and orderly completion of each part of the work. Coordinate construction activities defined in different sections, but dependent on each other for proper installation, interface and operation.

1. Plan construction activities in the proper sequence for best results when the installation of one part of the work depends on the installation of other components, either before or after.
2. Coordinate the installation of the various components to maximize performance and ensure accessibility for maintenance and repairs.
3. Make arrangements to receive items scheduled for installation at a later date.

7.0 SECTION 01 33 00 – SUBMITTAL PROCEDURES

7.01 DEFINITIONS

A. Action submittals: Information in written or graphic form and physical samples requiring action by the Engineer. Action submittals are those indicated in the individual specification sections as "action submittals."

B. Information submittals: Information in written or graphic form and physical samples requiring no action by the Engineer. Information submittals are those indicated in the individual specification sections as "information submittals."

7.02 ADMINISTRATIVE REQUIREMENTS FOR SUBMITTALS

A. Engineer's digital data files: The Engineer shall provide the Contractor with digital versions of contract drawings to facilitate preparation of submittals.

1. The Engineer shall provide the Contractor with digital versions of the contract drawings to facilitate preparation of project shop drawings and as-built drawings.

a. The Engineer makes no representation as to the accuracy or comprehensiveness of the digital versions of the contract drawings.

b. Digital drawing preparation software: The contract drawings are available in AutoCAD format.

c. The Contractor shall sign the digital data licensing agreement contained on the form attached as an appendix to this section.

d. The following digital data files are provided for each discipline involved:

1) Plan views, sections and elevations

B. Coordination: Coordinate the preparation and processing of submittals with the completion of construction activities.

1. Coordinate each submittal item with manufacturing, purchasing, testing, delivery, other submittal items and related activities requiring sequential execution.

2. Submit all submittals for each specification section at the same time, unless partial items for certain parts of the Work are indicated on the submittal schedule.

3. Submit action submittals and information submittals required under the same specification section separately, with separate packing slips.

4. Coordinate transmission of different types of submittals for related portions of Work so that processing is not delayed due to the need to review items at the same time for coordination.

a. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until such submittals have been received.

C. Processing time: Determine the length of time required to review a submittal, including the time needed to process a re-submitted submittal, as follows. The review period begins when the Engineer receives the submittal. No deadline extension will be permitted when submittals were not received with enough lead time before the start of work to allow for processing, including processing of a re-submitted submittal.

1. Initial review: Allow fifteen (15) business days for initial review of each submittal. Increase this time when coordination with subsequent submittals is required. The Engineer will notify the Contractor when a submittal received must be reviewed later due to coordination.

2. Interim review: Treat a submittal that requires interim review in the same manner as the original submittal.

3. Review of a re-submitted submittal: Allow fifteen (15) business days for review of each re-submitted submittal.

4. Sequential review: When sequential review of submittals by the Engineer, Architect, Departmental Representative or other parties is indicated, allow twenty-one (21) working days for initial review of each submittal.

D. Electronic submittals: Define and insert information in each electronic version of submittals as follows:

1. Consolidate all submittals into a single indexed file containing the submittal requirements for a single specification section, along with the transmission form with links to navigate to each item.
2. Name the file according to the submittal number or other unique identifier, including the revision identifier.
    a. The filename shall include the project identifier and specification section number followed by a decimal point and a sequential number (e.g. LNHS-061000.01). Re-submitted submittals shall have a number with a letter as a suffix following another decimal point (e.g., LNHS-061000.01.A).
3. Electronic submittal transmission form: Use a form generated using project management software, or other electronic form acceptable to the Engineer, and include the following information:
    a. Project name
    b. Date
    c. Engineer's name and address
    d. Construction manager's name
    e. Contractor's name
    f. Name of the firm or entity that prepared the submittal
    g. Names of the subcontractor, manufacturer and supplier
    h. Category and type of submittal
    i. Purpose and description of the submittal
    j. Specification section number and title
    k. Specification paragraph number or designation and generic name of the drawings for each item, when there are multiple items
    l. Drawing number and reference detail, as applicable
    m. Product installation location
    n. Related physical samples submitted directly
    o. Indication on submittal: complete or partial
    p. Sequentially assigned transmission number
    q. Record of the distribution and transmission of the submittal
    r. All other required identification
    s. Comments
4. Metadata: Include the following information as keywords in the metadata of the electronic version of the submittal:
    a. Project name
    b. Relevant specification section number and title
    c. Manufacturer's name
    d. Product name

E. Options: Indicate which options require the Engineer to make a selection.

F. Deviations and additional information: On a separate attached sheet, prepared on the Contractor's letterhead, record relevant information, data requests, revisions other than those requested by the Engineer on previous submittals, and deviations from contract document requirements, including minor modifications and limitations. Include the same identification elements as for the relevant submittal.

G. Re-submitted submittals: When a submittal is re-submitted, use the same format and include the same number of copies as for the original submittal.

1. Note the date and content of the previous submittal.
2. Note the date and purpose of the revision on the label or title block and clearly indicate the content of the revision.
3. Re-submit a submittal as many times as necessary for it to receive the Engineer's seal of review.

H. Distribution: Provide copies of final submittals to manufacturers, subcontractors, suppliers, installers, authorities having jurisdiction, and other parties involved in construction activities. Indicate distribution on the transmission forms.

I. Use for construction: Keep complete copies of submittals on the project site. Only use final submittals that received the Engineer's seal of review.

7.03 SUBMITTAL PROCEDURES

A. General procedure requirements for submittals: Prepare and submit submittals required in the individual specification sections. Submittal type is indicated in the individual specification sections.

B. Electronic submittals:

1. As directed, upload electronic submittals as PDF files directly to the project website or Engineer's extranet site, or submit the PDFs electronically via email.
    a. The Engineer will return an annotated file. Annotate and keep a copy of the file as an electronic record for the project.

C. Certificates and certification documents: Provide a statement signed by the entity responsible for preparing the certification. Certificates and certification documents must be signed by an official or other person authorized to sign documents on behalf of that entity.

D. Technical product data: Gather information into a single submittal for each construction item and product or equipment type.

1. When standard published data cannot be used and the information must be specially prepared for the purpose of the submittal, submit as shop drawings and not product data.
2. Mark each copy of each submittal indicating which products and options apply.
3. Include the following information, as applicable:
    a. Excerpts from the manufacturer's catalogue
    b. Manufacturer's product specifications
    c. Standard colour charts
    d. Compliance with specified reference standards
    e. Testing by a recognized testing agency

f. Testing agency labels and seals

g. Mention of coordination requirements

h. Information regarding availability and delivery lead times

4. For equipment, include the following additional information:

a. Wiring diagrams showing factory-installed circuits

b. Printed performance curves

c. Operating range diagrams

d. Required clearances with other installations where not shown on the shop drawings provided

5. Submit product data before or at the same time as samples.

E. Coordination drawing submittals: Comply with requirements set out in Section 01 31 00 – *Project Management and Coordination*.

G. Inspection and test reports and table of inspection and test submittals: Comply with the requirements set out in Section 01 78 00 – *Closeout Submittals*.

H. Closeout and maintenance submittals: Comply with the requirements set out in Section 01 78 00 – *Closeout Submittals*.

I. Field test reports: Submit written reports indicating and interpreting the results of field tests performed either during product installation or after product was installed in its final location, for verification of compliance with contract document requirements.

7.04 CONTRACTOR'S REVIEW

A. Information submittals: Review each submittal and verify coordination with other contract work and compliance with contract documents. Note corrections and dimensions taken at the work site. Affix seal of approval prior to submission to the Engineer.

B. Seal of approval: Stamp each submittal with a uniform seal of approval. Indicate the project name and location, submittal number, specification section title and number, name of reviewer, date of Contractor approval, and certify in writing that the submittal item was reviewed, verified, and approved in accordance with the contract documents.

7.05 ENGINEER'S REVIEW

A. The Engineer's review of the drawings is general and only intended as a service to the Contractor. It in no way relieves the Contractor of its responsibility to check the drawings, nor does it relieve the Contractor of the responsibility for any errors it may have made or for any changes to the Engineer's plans and specifications the Contractor may not have reported in writing to the Engineer.

B. Furthermore, the sole purpose of this review is to ensure the accuracy of the general design layout. This review does not imply that the Engineer approves the plans and details inherent in the shop drawings. The Contractor remains solely responsible for its drawings and such review does not relieve the Contractor of its responsibility for errors and omissions on the shop drawings, nor of its responsibility to meet all contract document requirements. The Contractor is also responsible for validating and certifying all dimensions at the work site.

C. Any comments or corrections made to the drawings in no way absolves the Contractor of its obligation to comply with all contractual requirements, nor do they constitute a guarantee or approval of any kind, in the case where an exception to these requirements would be present.

7.06 ACTION BY THE ENGINEER:

A. Action submittals: The Engineer reviews each submittal, marks required corrections or revisions and returns it. The Engineer will stamp each submittal with an appropriate seal indicating the response, as follows:

1. No comments – begin fabrication/installation
2. Begin fabrication according to annotations
3. Begin fabrication according to annotations, but re-submit corrected drawings
4. See comments or special instructions
5. Rejected – re-submit prior to fabrication
6. Cancel
7. Issue certified drawings

B. Information submittals: The Engineer reviews each submittal without returning it, or returns it if it does not meet requirements. The Engineer delivers each submittal to the appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when their use was pre-approved by the Engineer.

D. Incomplete submittals are unacceptable and considered non-compliant. They will be returned without review for re-submission.

E. Submittals not required under contract documents may be returned by the Engineer without action.

Submittals – Transmission Form

(Contractor shall complete this form and include with each set of shop drawings)

Project				
Client:	*Client's name*			
Name:	*Project title*			
Project numbers:	Client No.:	*99999*	TETRA TECH No.:	*99999*
Address:	*Building address*			

Specialized contractor			
Trade:	*Enter trade name, e.g.: Plumbing, fire protection, piping, electrical*		
Name:	*Company name*		
Address:	*Company address*		
Project manager:	*Name of specialized contractor's project manager*		
Phone:	*999-999-9999*	Email:	*Project.manager@Company.ca*

Stakeholders	Name	Contact person	Telephone	Email
General contractor (manager):	*Company name*	*Project manager's name*	*999-999-9999*	*Project.manager@Company.ca*
Architects:	*Company name*	*Site foreman*	*999-999-9999*	*Supervisor@Company.ca*
Structural engineer:	*TETRA TECH*	*Site foreman*	*999-999-9999*	*Supervisor@tetratech.com*
Mechanical engineer:	*TETRA TECH*	*Site foreman*	*999-999-9999*	*Supervisor@tetratech.com*
Electrical engineer:	*TETRA TECH*	*Site foreman*	*999-999-9999*	*Supervisor@tetratech.com*

Equipment supplier	
Company	*Name of company supplying equipment*
Address:	
Person responsible:	*Contact person*
Phone:	*999-999-9999*
Fax:	*999-999-9999*
Email:	*Contact@Company.ca*

Details			
Description: *Description of submitted drawings*			
Drawing no.:	*Sequential no.*	Revision:	*00*
No. of pages:			
Specification section:	*99 99 99 (maximum of one section per form)*		
Article number(s):	*E.g.: Articles 2.18, 2.19 and 2.20*		
Plan no.:	*Plan number, if specified on the plan*		

NOTE: **If a Contractor wants to obtain the AutoCAD versions of the TETRA TECH plans, copy the following agreement on to company letterhead and have an authorized representative sign the agreement.**

Laval, on

Mr.
TETRA TECH
2500 Daniel-Johnson Boulevard
Suite 810
Laval, Quebec H7T 2P6

Project name:

TETRA TECH project number:

Subject: **Electronic drawing file usage agreement**

Dear Sir:

We, , release TETRA TECH from any liability that may arise from the use of the AutoCAD computer files used for submittals and development of our own detailed installation drawings.

We acknowledge that the AutoCAD files in question are loaned to us free of charge for our exclusive use, and we agree not to distribute them.

We further agree that we will not hold TETRA TECH responsible in the event that the AutoCAD files in question contain certain inaccuracies or errors (mechanical, electrical, structural or architectural, if applicable), and we agree to verify the accuracy of the information contained therein as if we had produced the entirety of these drawings ourselves.

Signature

Please print name/title

Address

Telephone Fax

Email

8.0 SECTION 01 35 16 – PROCEDURES FOR PROJECTS IN EXISTING BUILDINGS

8.01 DEFINITIONS

A. Renovation work: applies to remodeling, renovation, repair and maintenance work performed on existing premises or surfaces as part of the project.

B. Consolidate: reinforce loose or deteriorated materials in place.

C. Dismantle: remove by disassembling or detaching an item from a surface, using gentle and non-aggressive methods and equipment, ensuring not to damage the item or surface. Item is then disposed of unless it is to be recovered or reinstalled.

D. Harmonize: integrate with adjacent construction so there is no visible difference in type, character, profile, shape, detail, colour, grain, texture or finish of materials, as approved by the Engineer.

E. Refinish: remove existing finish to base material and apply a new finish to match the original or as prescribed.

F. Repair: correct damage and defects, maintaining existing materials, features and finishes. This includes patching, reattaching, splicing, consolidating, reinforcing or leveling materials.

G. Replace: remove and reproduce an item entirely, then install the new item. The original item is used as a template for creating a duplicate unless otherwise indicated.

H. Duplicate: reproduce with the exact same details, materials and finishes, unless otherwise indicated.

I. Reproduce: fabricate a new item, identical in detail to the original, in the same or similar material as the original, unless otherwise indicated.

J. Preserve: keep existing items that are not to be removed or dismantled.

K. Strip: remove existing finish down to the base material, unless otherwise indicated.

8.02 REPAIR, REPLACEMENT AND PATCHING MATERIALS

A. Use the same materials and finishes as existing.

8.03 PROTECTION

A. Remove, reinstall and repair existing structures and fixtures as necessary to perform other project Work.

B. Protect people, motor vehicles, building envelope surfaces, building site, plants and neighbouring buildings from damage resulting from the renovation work.

1. Use only proven methods of protection, appropriate for each area and surface to be protected.

2. Contain dust and debris generated during the Work and prevent contact with the public or adjacent surfaces.
3. Protect floors and other surfaces along material transport routes from damage, wear and stains.

C. Utilities and communications services:

1. Prior to start of work, notify the Departmental Representative, Engineer, authorities having jurisdiction, and entities that own or operate the cables, conduits, piping and other technical services affected by the renovation work.
2. Disconnect utilities and seal piping as required for Work and by authorities having jurisdiction.
3. Preserve existing services unless otherwise indicated; keep them in service and protect from damage during Work. Provide temporary service which existing general service is interrupted.

D. Existing drains: Before starting work in an area, test the drainage system to ensure that it is functioning properly. Notify the Engineer immediately of inadequate drainage or blockage. Do not begin Work in an area until the drainage system is functional.

1. Prevent solids such as adhesive, mortar residue or other debris from entering the drainage system. Clean drains and exhaust vents that become clogged or blocked with sand or other materials resulting from renovation activities.
2. Protect drains from pollutants. Block drains or filter out sediment to ensure only clean water passes through.

E. Existing ceilings: Before performing work in spaces above existing ceilings, remove and store acoustical ceiling tiles safely. When necessary, remove and store ceiling hangers as well. Upon completion of Work, reinstall ceiling tiles. Replace any tiles and main or secondary tees damaged during Work.

1. When gypsum ceilings must be opened for Work, repair and refinish them upon completion of Work.

8.04 FIRE PROTECTION

A. General: Comply with the fire protection plan and following recommendations:

1. Meet National Fire Code of Canada requirements, unless otherwise indicated. Perform duties normally assigned to the Departmental Representative with respect to fire protection.
2. Remove combustible materials, including, without being limited to, scrap, paper, garbage and chemicals from the area unless they are needed for immediate work.
    a. Where combustible material cannot be re-located, cover with a fire blanket.

B. Heat-producing equipment and combustible materials: Follow the procedures below when working with heat-producing equipment and combustible materials, including when welding, flame cutting, soldering, brazing, removing paint with heat, or other operations requiring the use of an open flame, high-temperature accessories or combustible solvents and chemicals.

1. Obtain approval from the Departmental Representative for operations involving equipment that use an open flame, welding equipment or other equipment operating at a high temperature. Notify the Departmental Representative at least seventy-two (72) hours prior to such an operation, specifying the location.
2. Wherever possible, limit the use of heat-producing equipment to the shop floor or outdoors.

3. Do not perform any work involving heat-producing equipment in or near any room or area containing or likely to contain flammable liquids or explosive vapours. Ensure the area is safe by testing with a combustible gas detector.
4. Using a fire screen, prevent flames, sparks, hot gases or other high-temperature materials from coming into contact with nearby combustible materials.
5. Prevent sparks and hot metal particles from entering open doors or windows, holes and cracks in floors, walls, ceilings, roofs and other openings.
6. Fire watch: Before starting any work involving the use of heat-producing equipment or combustible materials, post fire watch personnel in the area. Fire watch personnel shall have the authority to enforce fire safety. Implement a fire watch in accordance with the requirements of the National Fire Code of Canada, other authorities having jurisdiction, and the following conditions:
    a. Train each fire watch person in the use of firefighting equipment and fire alarms.
    b. Prohibit fire watch personnel from doing any other work that might distract them from their duties.
    c. Only work with heat-producing equipment when fire watch personnel are present.
    d. Require fire watch personnel to perform a final safety inspection every day within at least thirty (30) minutes of a job being completed in each zone to detect possible hidden or smoldering fires and thus ensure that adequate fire prevention is maintained.
    e. Keep fire watch personnel in each zone of the project site for two hours after completion of daily work.

C. Fire fighting equipment: Provide and maintain fire extinguishers, fire blankets and rag buckets to dispose of rags soaked with combustible liquid. Choose equipment according to the type of risk in the work zone. Ensure that nearby personnel and fire watch personnel are properly trained in the use of a fire extinguisher and fire blanket.

D. Sprinklers: ensure existing sprinkler protection is maintained without interruption during Work. When working near sprinklers, protect them with temporary screens.
1. Remove temporary screens at the end of shifts, during breaks and when Work in the vicinity is completed.

8.05 REPAIR AND PATCHING

A. Perform all repair and replacement work on floor, ceiling and wall finishes damaged by the Work.

B. Repair and make adjustments as needed to adequately finish work. Patch baseboards, walls and floors, and paint ceilings and walls up to the closest edges (including all work to patch around openings).

9.0 01 41 00 – REGULATORY REQUIREMENTS

9.01 CODES AND STANDARDS

A. All work including design, materials, equipment, construction and arrangement of all equipment, components and accessories shall meet all requirements of applicable codes and standards (latest editions), ordinances, orders and regulations, as well as revision bulletins issued by applicable municipal, provincial, federal or other agencies.

B. All pressure vessels shall be constructed and installed in accordance with applicable CSA, ASME and ASTM standards, as well as any other provincial standards adopted as a minimum standard.

C. Comply with applicable CSA electrical bulletins; although not numbered in this Division, they are to be considered part of the Canadian Electrical Code or the electrical code for Québec.

D. The applicable requirements from standards shown on the drawings and in the specifications shall never be reduced on the grounds that provincial and local regulations are less stringent. Where there is a contradiction between plans, regulations or codes, the most restrictive requirement shall apply. The Engineer reserves the right to interpret their own plans and specifications.

E. Where the specification refers to a standard, the latest edition in force on the date work began shall apply. Obtain current editions of applicable codes and standards.

F. All equipment and structures, as well as testing and quality assurance, shall meet applicable standards and codes from the following associations:

ACNOR:	Association Canadienne de normalisation
CSA:	Canadian Standards Association
EEMAC:	Electrical and Electronic Manufacturers Association of Canada
ANSI:	American National Standards Institute
ASME:	American Society of Mechanical Engineers
ASTM:	American Society for Testing and Materials
NBC:	National Building Code of Canada
NPC:	National Plumbing Code of Canada
CEC:	Canadian Electrical Code with Québec Amendments
IPCEA:	IEEE: Institute of Electrical and Electronics Engineers International Power Cable Equipment Association
NEMA:	National Electrical Manufacturers Association
NFPA:	National Fire Protection Association
CGSB:	Canadian General Standards Board

9.02 APPROVED EQUIPMENT

A. All installed fixtures and equipment must bear a seal for the various standards and approval bodies that govern such equipment, including CSA, ULC and FM seals.

B. In the event that there is no alternative to providing unapproved equipment, obtain and pay for specific approval from a recognized inspection agency before the equipment is put into operation.

9.03 PERMITS AND TAXES

A. Pay for all permits and taxes required by authorities and comply with the codes and regulations in force (latest edition).

B. Complete a building permit application and street cut permit application (if required). Pay all fees for these permit applications.

C. Complete any other permit applications required for the Work and assume all costs for such.

9.04 INSPECTION AND RECORDS

A. Have all required plans approved by inspection services prior to commencement of Work and pay all associated costs.

B. Ensure that Work is inspected during construction and obtain certificates of approval from authorities having jurisdiction when Work is completed and systems have been checked and started up in accordance with the Architect's and Engineer's instructions.

C. Prior to issuance of final payment certificates, provide all necessary inspection certificates as evidence that mechanical and electrical installations comply with the laws and regulations of all relevant authorities.

10.0 SECTION 01 60 00 – PRODUCT REQUIREMENTS

10.01 MATERIAL AND EQUIPMENT

A. Unless otherwise indicated, all materials shall be new, high quality and free of manufacturing defects.

B. Supply and install new materials and equipment of prescribed design and quality, performing to established standards and for which replacement parts are readily available.

C. Unless otherwise indicated, use products from a single manufacturer for materials and equipment of the same type or class.

D. Corresponding parts of the same or identical equipment shall be interchangeable and when interchanged shall have equal performance.

E. Units will be designed so that installation, dismantling and maintenance can be done at minimal cost.

F. Control panels and components shall be assembled at the factory.

10.02 STORAGE AND HANDLING

A. Storage of equipment on the work site is not permitted, except when specifically authorized by the Departmental Representative.

B. Transport all equipment or merchandise immediately to the location where it will be installed or stored. It is strictly forbidden to leave equipment on the delivery platform for any reason whatsoever.

C. Deliver and store materials and equipment on the work site such that the manufacturer's seal and label remain intact.

D. Prevent damage, alteration or soiling of materials and equipment during delivery, handling and storage. Remove materials and equipment rejected by the Contractor, Departmental Representative, Engineer, or Architect from the site immediately.

E. Store materials and equipment according to suppliers' instructions.

F. Repair damage to finished surfaces on the work site to the Engineer's satisfaction. Use a primer or enamel to match original finish. Do not paint nameplates.

G. Store materials intended for indoor installation indoors or protected from the weather.

H. Move stored materials and equipment that interfere with the work of the Engineer or other trade.

I. Obtain permission from the Departmental Representative to store equipment in locations defined by the Departmental Representative.

10.03 VOLATILE PRODUCTS

A. Five (5) working days prior to commencement of work, notify the Departmental Representative in writing of the use of any product or process that may give off strong odors, fumes or gases and provide two (2) copies of Safety Data Sheets (SDS) for each controlled product that will be used in construction work.

1. Send the notices and two (2) copies of the SDSes to the Departmental Representative.

B. Ensure that all containers have appropriate WHMIS labels.

C. Have a copy in its possession of the SDS for each controlled product.

D. Train staff according to the legislation in effect, and provide proof of such.

E. Provide adequate ventilation when using these products, materials and procedures, to ensure building users are not inconvenienced.

11.0 SECTION 01 73 00 – EXECUTION

11.01 DEFINITIONS

A. Cutting out: Removal of existing construction as needed, to install a component or perform other Work.

B. Repair: Work to repair and restore construction to its original condition, after installing other components.

11.03 MATERIALS

A. General: Comply with the requirements set out in other sections.

B. Existing materials: Use the same materials for repairs as those already in place. For exposed surfaces, use materials that harmonize with existing adjacent surfaces as much as possible.

1. Where identical materials are not available or cannot be used, provide materials that, when installed, will harmonize sufficiently with existing materials, and are acceptable to the Engineer from a visual and performance standpoint.

11.04 INSTALLATION

A. General: Position elements and components precisely, according to layout and elevations indicated.

1. Ensure vertical elements are plumb and horizontal elements are level.
2. Where space is limited, install components to maximize amount of space available for maintenance and removal of parts for replacement.
3. In areas to be finished, conceal pipes, ducts and cables unless otherwise indicated.

B. Follow manufacturer's written guidelines and recommendations when installing products in the indicated applications.

C. Install products at optimal time and under optimal conditions to ensure best possible results. Maintain conditions to ensure good product performance until substantial completion.

D. Execute construction work such that none of the elements involved will be damaged by harmful activities or a load greater than expected under normal occupancy conditions.

E. Provide sufficient sequence and clearance for moving components to the work site and positioning them in final locations.

F. Tools and equipment: Do not use tools or equipment that generate harmful noise levels.

G. Templates: Obtain and distribute templates for components specified as factory-produced and field-installed. Check shop drawings for other components to ensure that adequate provision has been made for positioning and installing products to meet stated requirements.

H. Mounting: Provide fastening and locking plates and anchors, as well as fasteners of sufficient size and quantity to securely mount each component, accurately positioned and aligned with other constructed parts. If there are no indications of the dimensions and types of fasteners, establish these parameters according to required load conditions.

1. Mounting height: If not specified, mount components at height specified by the Engineer.
2. Take into account building movement, including thermal expansion and contraction.
3. Coordinate installation of anchors. Provide drawings, templates and instructions for installation of anchors, including sleeves, concrete embedments, anchor bolts and items with built-in anchors to be embedded in concrete or masonry. Deliver such items to the work site in time for installation.

I. Joints: Make joints uniform in width. For exposed construction, when there are no indications on where to position the joints, arrange them to obtain best possible visual effect. Make visible connections by forming perfectly abutting joints.

J. Hazardous materials: Use products, cleaning agents and materials for installation that are not considered hazardous.

11.05 CUTTING AND REPAIR

A. Meet requirements and limitations for cutting and repairing building components.

1. Structural components: When cutting and repairing structural components, inform the Engineer of the locations and details. Await the Engineer's instructions before beginning. Shore, brace and support structural members adequately during cutting and repair. Ensure method of cutting and repairing structural members does not change load carrying capacity or increase deflection.

2. Operational components: The method of cutting and repairing operational elements and related components shall not reduce their ability to meet intended requirements, increase maintenance requirements, or reduce service life or safety. Operational items include, without being limited to:
    a. Primary operational systems and equipment
    b. Fire suppression systems
    c. Piping, ductwork, tanks and mechanical systems equipment
    d. Control systems
    e. Conveyors
    f. Equipment supports
    g. Soundproofing and anti-vibration devices and systems
    h. Electrical wiring systems
    i. Communication systems
    j. Fire detection and alarm systems
    k. Special construction systems
3. Other construction components: The method of cutting and repairing other construction components shall not reduce their ability to meet the intended requirements, increase maintenance requirements, or reduce service life or safety. Other building elements include, without being limited to, the following:
    a. Fire stop partitions
    b. Air or smoke barriers
    c. Moisture or vapour barriers
    d. Membranes and flashing
    e. Construction of exterior curtain walls
    f. Fire-resistant sprayed materials
4. Visual components: The method of cutting and repairing construction should not leave any visible traces. The cutting and repairing of exposed construction shall not, in the opinion of the Engineer, detract from the aesthetic qualities of the building. Remove and replace any construction that has been cut and repaired in an unsatisfactory manner from a visual standpoint.

B. Entrust cutting and repair work to experienced workers. Perform cutting and repair work as soon as possible and complete it without delay.
    1. Cut building components in place to allow installation of other components or to perform other construction work, then restore surfaces to original condition.

C. Existing warranties: Remove, replace, restore and repair materials and surfaces cut or damaged during installation or cutting and repair work, using methods and materials that will not void existing warranties.

D. Protection: Protect existing building components during cutting and repair work to prevent damage. Protect components that may be exposed during cutting and repair operations from the elements.

E. Adjacent occupied areas: Where impact on the use of adjacent areas or interruption of free passage to adjacent areas cannot be avoided, coordinate cutting and repair work as required by Section 01 11 00 – *Summary of Work.*

F. Cutting out: Cut out components in place by sawing, drilling, chipping, grinding or similar method, including excavation, using techniques least likely to damage components to preserve or adjacent built-up areas. Whenever possible, review proposed methods with the original installer and follow the original installer's written recommendations.

1. In general, use hand or low-powered tools designed for sawing and grinding; do not hammer or chop. Cut clean holes and slots to minimum required dimensions with minimal disturbance to adjacent surfaces. Temporarily cover unused openings.
2. Finished surfaces: Cut or drill toward concealed surfaces from the exposed or finished side.
3. Concrete and masonry: Cut with a tool intended for that purpose, such as an abrasive saw or diamond core drill.
4. Mechanical and electrical services: Cut pipes or ducts in the walls or partitions to be removed. Plug and seal any portions of pipes or ducts that will remain to prevent moisture or other foreign materials from entering.
5. Repair after construction work requiring cutting operations are completed.

G. Repair: Repair components by filling, sealing, refinishing, closing, etc. after other work is complete. Joints formed during repairs should be as invisible as possible. Provide materials and meet installation requirements specified in other sections, where applicable.

1. Inspection: Where feasible, test and inspect restored areas to demonstrate the physical integrity of the facility.
2. Exposed finishes: Refinish exposed finishes of the repaired areas and extend this operation to the adjacent components that were preserved, minimizing any trace of repair and refinishing.
    a. Clean pipes, ducts and similar components before applying paint or other finishing materials.
    b. Restore damaged pipe casings to their original condition.
3. Floors and walls: Where walls or partitions are to be removed, overlap finished areas, refinish and repair floor and wall surfaces in the new space. Finish to uniform surface, colour, texture and appearance. Remove existing floor and wall coverings and replace with new ones, if necessary, to obtain uniform colour and appearance.
    a. When repairing a painted surface, prepare the substrate and apply primer and intermediate coats of paint that are suitable for the substrate, then apply the final coat of paint to the entire surface where the repaired area is located. Apply additional coats of paint until the repaired area blends with adjacent surfaces.
4. Ceilings: Restore, repair or re-hang ceilings to obtain a uniform surface and appearance.
5. Exterior building envelope: Repair components to restore the envelope's weatherability and integrity with respect to heat and moisture.

H. Cleaning: Clean areas and spaces where cutting and repair work was performed. Remove paint, mortar, oil, sealant and similar materials from adjacent finished surfaces.

11.07 START-UP AND ADJUSTMENTS

B. Start up equipment and operational components to confirm proper operation. In case of malfunction, remove the unit, replace it with a new one and re-test.

C. Adjust equipment for proper operation. Adjust operational components for proper and smooth operation.

D. Perform operational testing on all equipment. Test and adjust controls and safety fixtures. In case of damage or malfunction, replace the affected controls and equipment.

11.08 PROTECTION OF BUILT FACILITIES

A. Provide final protection to maintain conditions such that installed components will not deteriorate or suffer damage upon substantial completion.

B. Follow the manufacturer's written guidelines with respect to temperature and relative humidity.

12.0 SECTION 01 74 13 – CLEANING DURING CONSTRUCTION

12.01 SITE CLEANLINESS

A. General: Clean project site and work areas daily, including common areas. Follow instructions closely. Dispose of materials in compliance with the law.

1. Comply with NFPA 241 regarding the removal of combustible waste and debris.
2. Do not store waste for more than seven days under normal atmospheric conditions or for more than three days when the temperature rises above 27°C (80°F).
3. Separate hazardous and unhealthy waste from other waste by placing it in containers. Identify containers properly and dispose of waste according to regulations.
    a. Use containers intended for the type of waste to be stored.
4. Coordinate cleanup during work in areas used by Contractor and other contractors.

B. Site: The project site shall be kept free of waste and debris.

C. Work areas: Carefully clean areas where Work is being done to ensure proper execution.

1. Promptly clean liquid spills.
2. When dust is likely to interfere with the proper execution of the Work, clean work zone with a broom or vacuum cleaner, as needed.

D. Installed components: Keep installed components clean. Clean surfaces of installed components according to product manufacturer's written instructions, only using specifically recommended cleaning products. If there are no recommended cleaning products, use products that are not harmful to health or components and that will not damage exposed surfaces.

E. Concealed spaces: Before closing a concealed space, remove any debris.

F. Exposed surfaces and finished areas: Clean and protect exposed surfaces from damage and deterioration until substantial completion.

G. Waste disposal: Do not burn or bury waste at project site. Do not flush waste into sewers or waterways.

H. When handling and installing, clean and protect components under construction, as well as adjacent components already in place. Where necessary, apply a protective coating against damage or deterioration until substantial completion.

I. Clean and maintain the constructed components as often as necessary until the end of the construction period. Adjust and lubricate components as required to prevent damage.

J. Exposure limitation: Supervise construction activities so that no part of the facility, completed or in progress, is subject to harmful, hazardous exposure that may result in damage or deterioration during the construction period.

13.0 SECTION 01 74 23 – FINAL CLEANING

13.01 FINAL CLEANING

A. Upon substantial performance of Work, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

B. Remove waste products and debris and leave premises clean and suitable for occupancy.

C. Prior to final review remove surplus products, tools, construction machinery and equipment.

D. Remove debris and waste materials.

E. Dispose of construction waste materials off-site at regularly-scheduled times or dispose of as directed by the Engineer or Departmental Representative. Do not burn waste materials on site, unless authorized by the Engineer or Departmental Representative.

F. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

G. Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

H. Remove dust, stains, marks and scratches from decorative work, electrical and mechanical fixtures, furniture, walls and floors.

I. Clean lighting reflectors, lenses, and other lighting surfaces.

J. Vacuum clean and dust building interiors, behind grilles, louvres and screens.

K. Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

L. Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

M. Sweep and wash exterior sidewalks, steps and surfaces; rake or sweep clean other surfaces of grounds.

N. Remove dirt and other disfiguration from exterior surfaces.

O. Clean and sweep roofs, gutters, areaways, and sunken wells.

P. Sweep and wash clean paved areas.

Q. Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

R. Clean roofs, downspouts, and drainage systems.

S. Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

T. Remove snow and ice from access to building.

14.0 SECTION 01 75 00 – START-UP AND ADJUSTMENT

14.01 START-UP

A. Retain and pay for the services of authorized representatives of the manufacturers of equipment installed at the site to supervise equipment start-up and to check, adjust, balance and calibrate the various components.

B. Provide these services over a sufficient period of time, allowing for the number of visits necessary to get the equipment up and running and to ensure that operating personnel are familiar with all aspects of equipment maintenance and operation.

14.02 SHOP TESTS

A. When shop testing of equipment is specified in the specifications, the Engineer and Departmental Representative reserve the right to examine the equipment at the plant and witness the testing.

B. Notify the Engineer and the Departmental Representative at least one week in advance of the date, time, and location of the shop tests.

C. Forward three certified copies of the factory test reports to the Engineer.

14.03 FIELD TESTS

A. Upon completion of the Work, perform tests to prove that the Work meets all required conditions with authorities having jurisdiction and Engineer in attendance.

B. If the work shows any defects, remedy such defects and prove that the work fully meets contract requirements by performing a second test with Engineer in attendance.

C. Provide Engineer with forty-eight (48) hours' written notice of test date.

1. If the Engineer arrives at the work site at the date and time agreed but the tests cannot be performed, the Engineer will forward an invoice to the Contractor for the unrequired site visit. Minimum cost will be $750.

D. Do not insulate or conceal work until it has been tested and approved. Follow work schedule and make necessary arrangements for the test.

E. Before testing, disconnect any equipment or other materials that are not designed to withstand test stresses.

14.04 RESPONSIBILITY DURING TESTING

A. The Departmental Representative reserves the right to use any mechanical or electrical equipment installed under the terms of this Agreement for whatever time and duration required, and to test such equipment thoroughly and comprehensively prior to substantial completion and acceptance of the Work. Such tests shall not be construed as evidence that any part of the work is accepted and it is understood and agreed that no claim for damages shall be made by the Contractor for damage or breakage to any part caused by the above tests, whether caused by weakness of parts, defective materials or poor workmanship.

B. Major pieces of equipment shall be checked with a representative of the manufacturer, the Architect and the Engineer in attendance. These individuals shall be notified with sufficient notice to be able to attend the testing and conduct a proper inspection.

C. Provide all labour and materials required for testing.

15.0 SECTION 01 78 00 – CLOSEOUT SUBMITTALS

15.01 DOCUMENTS REQUIRED WITH REQUEST FOR ACCEPTANCE

A. No application for acceptance of Work by the Contractor shall be considered unless it is accompanied or was preceded by all of the following certificates, statements, certifications and documents:

1. Documents and materials to be provided:
    a. Warranty of the manufacturer of devices and equipment of this Contract
    b. Warranty for the Work
    c. Six copies of the operation and maintenance manuals (instruction manuals)
    d. A letter of certification and proof of compliance with the requirements set out in the *Regulation respecting occupational health and safety*
    e. A clean copy of the plans kept on site, with all changes made during construction noted in red pencil

15.02 FINAL ACCEPTANCE OF THE WORK

A. Refer to the Contract terms and conditions for details.

B. If, due to negligence by the Contractor to verify and correct deficiencies noted at provisional acceptance of the Work or to provide documents required for final acceptance of the Work, the professionals are required to make more inspection visits than the number stipulated in the Contract, the Departmental Representative may withhold from the Contractor the amount of additional fees payable to the professionals for the additional inspection visits attributable to the Contractor's negligence or the negligence of the trade contractors.

15.03 EQUIPMENT OPERATING AND MAINTENANCE MANUAL

A. Upon completion of the Work, submit six (6) copies of a maintenance manual to the Engineer, compiling operation and maintenance data for the equipment. This manual will be written in French or in the language spoken by the client, in accordance with the client's instructions. It will be prepared as follows:

1. Record data on 215 mm x 275 mm (8-½" x 11") loose sheets bound in a three-ring binder with a hard vinyl cover.
2. Write the title "Operation and Maintenance Guide" on the title page, along with the name of the facility, the date and the table of contents.
3. Divide the content into appropriate sections according to the subdivisions of the corresponding specifications. Mark each section with a labeled celluloid-covered tab attached to a divider made of stiff paper.

B. Include the following information in each section of the Operations and Maintenance Manual:

1. Tables of contents for the section
2. List of replacement parts
3. List of special tools
4. Copies of various warranties and bonds indicating:
   a. Name and address of the work
   b. Warranty effective date (date on the final certificate of completion)
   c. Warranty period
   d. The specific purpose of the warranty and the remedial action provided by the warranty.
   e. Contractor's signature and seal.

C. Include the following information in the operation and maintenance records in addition to the prescribed data:

1. Details of the components, construction characteristics, as well as function and maintenance requirements of the various components that will facilitate start-up, operation, maintenance, repair, modification, extension and expansion of any part, system or feature of the installation;
2. Technical data and product specifications shall be accompanied by additional information such as bulletins, illustrations and exploded views of component parts, technical descriptions and parts lists;
3. Comprehensive description of equipment and parts including a list of required spare parts. Include nameplate data, such as the brand name, dimensions, capacity and serial number.
4. Name, address, telephone and fax numbers of trade contractors and suppliers.
5. A copy on compact disc of the plans and manufacturing drawings in digital format (AutoCAD or other).

D. Additional materials used to complete the Work and listed in the various sections, along with the name of the manufacturer and supply source.

E. Type lists and comments neatly. Ensure manufacturers' drawings, diagrams or publications are clear. Advertisement flyers or brochures are not acceptable.

F. Add a complete set of shop drawings (approved and bound separately) with corrections and changes made during fabrication and installation.

15.05 "AS-BUILT" DRAWINGS

A. A copy of the plans relating to the Work shall be kept on the work site and all changes in the Work shall be noted, in red, as they are made.

B. Preserve the drawings and accurately record all deviations from contract document requirements, changes necessitated due to the nature of the work site, and changes orders requested by the Departmental Representative, Engineer or Architect.

C. Enter the following information:

1. Field changes to dimensions or execution details
2. Changes made as a result field change orders

D. Assign two sets of these drawings to go into the project file.

16.0 SECTION 01 79 00 – DEMONSTRATION AND TRAINING

16.01 OPERATING AND MAINTENANCE PERSONNEL TRAINING

A. Provide tools, materials and qualified instructors to train operating and maintenance personnel in the operation, control, maintenance, adjustment, troubleshooting equipment operation and function, as well as any changes or modifications made to the equipment under warranty.

B. Training shall be conducted during normal working hours, before systems have been accepted and handed over to operating personnel.

C. Show operators how to operate and maintain installations.

D. Train maintenance staff on the requirements of the new installations.

E. At minimum, training shall include theory (including concrete examples on paper) and practice.

F. Provide these services for the desired period and number of visits necessary to get the installation up and running, and to ensure that operators and maintenance personnel are familiar with the various aspects of equipment maintenance and operation.

G. The operation and maintenance manual shall be used for training personnel and shall be verified by the Engineer before training begins.

Partie 1 General

1.1 WORK BY OTHERS

.1 Co-operate with other contractors and carry out Departmental Representative's instructions.

.2 Co-ordinate work with that of other contractors. If any part of Work under this Contract depends upon work of another Contractor for proper execution or result, promptly report in writing to Departmental Representative any defects that may interfere with proper execution of Work.

1.2 FUTURE WORK

.1 Ensure that Work avoids encroachment into areas required for future work.

1.3 WORK SEQUENCE

.1 Construct work in stages to accommodate Departmental Representative's continued use of premises during Work.

.2 Co-ordinate progress schedule according to occupancy during Work.

.3 Maintain fire access/control.

1.4 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work to allow:

.1 Departmental Representative's occupancy.

.2 Coordinate use of site as directed by Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work to remain.

.5 Repair or replace portions of existing work that have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.6 At completion of operations, existing work: be in condition equal to or better than that which existed before new Work started.

1.5 DEPARTMENTAL REPRESENTATIVE'S OCCUPANCY OF PREMISES

.1 Departmental Representative shall occupy premises throughout entire construction period for execution of normal operations.

.2 Cooperate with Departmental Representative in scheduling operations to minimize conflict and facilitate Departmental Representative's usage.

1.6 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants and normal use of premises. Arrange with Departmental Representative to facilitate execution of Work.

1.7 DOCUMENTS REQUIRED

.1 At work site, maintain one copy of each document as follows:

.1 Contract drawings
.2 Specifications
.3 Addenda
.4 Reviewed shop drawings
.5 List of outstanding shop drawings
.6 Change orders
.7 Other modifications to contract
.8 On-site test reports
.9 Copy of approved work schedule
.10 Health and safety plan and other safety-related documents
.11 Other documents as specified

Partie 2 Products

2.1 NOT USED.

.1 Not used.

Partie 3 Execution

3.1 NOT USED.

.1 Not used.

END OF SECTION

1. GENERAL

1.1. PURPOSE

1.1.1. To ensure that Work and facility activities can be carried out concurrently without delay or hindrance to either, and that facility security is maintained at all times.

1.2. DEFINITIONS

1.2.1. CSC: Correctional Service Canada.

1.2.2. Director: Director of the facility.

1.2.3. Departmental Representative: Any employee who is mandated to act, supervise, coordinate and/or monitor the Work.

1.2.4. Work enclosure: Area where Contractor is authorized to work, as indicated on project plans. Work enclosure may be isolated from perimeter of facility.

1.2.5. Perimeter: Area of facility surrounded by fencing or walls, preventing inmates from leaving.

1.2.6. Prohibited items:

a) Intoxicants, including alcohol, drugs or narcotics

b) Weapons or parts of weapons, ammunition, any object designed to kill, injure or immobilize, or object modified or assembled for such purposes, unless possession was pre-authorized

c) Bombs, explosives or any part of such

d) Amounts of cash in excess of regulatory maximum

SPECIAL NOTE: Verify Corrections and Conditional Release Regulations (SOR/92-620): $50.00 limit in a minimum security facility, $25.00 limit in a medium, maximum or multi-level facility.

e) Anything else possessed without authorization that may endanger the safety of a person or the penitentiary

f) Tobacco and related products, including but not limited to cigarettes, electronic cigarettes, cigars, tobacco, chewing tobacco, cigarette makers, matches and lighters are permitted if consumed outdoors

1.2.7. Commercial vehicle: vehicle intended to transport materials, equipment, or tools required for Work.

1.3. PRELIMINARY MEASURES

1.3.1. Before start of Work, meet with Departmental Representative to:

a) Discuss nature and scope of project-related activities.

b) Establish security measures acceptable by both Parties, in accordance with this directive and specific facility requirements.

1.3.2. Contractor shall:

a) Inform employees of security-related requirements.

b) Collaborate with facility personnel to ensure all Contractor employees comply with security-related requirements.

1.4. CONTRACTOR EMPLOYEES

1.4.1. At the Director's discretion, the Contractor shall make provision for the fact that employees may not be admitted to the facility without a security clearance and current photo identification card, such as a provincial driver's license.

1.4.2. Provide Departmental Representative with the names and dates of birth for all employees who will be working in the facility or at any other CSC site, along with the security clearance request for each employee ("Request to Access a Federal Institution" form). Allow two (2) weeks to process security clearance requests.

1.4.3. No person believed to be a security risk shall be permitted to enter the premises.

1.4.4. Persons shall be immediately expelled from the facility if:

a) They appear to be under influence of alcohol, drugs or narcotics.

b) They have abnormal or disorderly conduct.

c) They have prohibited items.

1.4.5. Any individual requesting entrance to the facility may be required to fill out a questionnaire or answer questions about their current health status. Body temperature may be taken, as required by the Director. As a result of these checks required by the CSC, individuals may be denied access to the facility.

1.5. DELIVERIES

1.5.1. All deliveries of materials, equipment, or tools for Work shall be addressed to the Contractor to distinguish them from deliveries intended for the facility. Contractor shall ensure that its employees are on site to receive deliveries, since CSC staff will accept **no** deliveries of materials, equipment or tools intended for the project.

1.6. COMMUNICATION DEVICES

1.6.1. Cellular or digital wireless phones including, without being limited to, messaging devices, pagers, BlackBerries, phones used as two-way radios, laptops and tablets are permitted in the facility. While they are permitted, inmates are not permitted to use such devices under any circumstances.

1.6.2. Director may approve, but limit use of two-way radios.

1.7. TOOLS AND EQUIPMENT

1.7.1. Maintain a complete list of tools and equipment used during Work. Submit list for inspection when required. Keep list of tools and equipment up-to-date throughout Work.

1.7.2. Never leave tools unattended, especially power tools, files, saw blades, hacksaws, wires, ropes, ladders and anything used for lifting (jacks, etc.).

1.7.3. Store tools and equipment in a secure, authorized location.

1.7.4. Lock all toolboxes after use. Contractor employees must keep toolbox keys with them at all times. Secure and lock scaffolds that are not erected. When erected, scaffolds shall be securely fastened to Departmental Representative's satisfaction.

1.7.5. Notify Departmental Representative immediately of any lost or missing tools or equipment.

SPECIAL NOTE: The way in which controlled items are managed varies from facility to facility. It is therefore necessary to check with facility involved.

1.7.6. If propane or natural gas is used to provide heat for Work, the facility will need to mandate an employee to supervise the site during non-working hours.

SPECIAL NOTE: This is a concern if work site is located near inmate living units. A fire can endanger human lives. Check the facility's policy on this subject.

1.8. KEYS

1.8.1. The Departmental Representative who escorts Contractor employees shall obtain keys necessary to open doors as the Contractor requires. Contractor shall inform its employees that the Departmental Representative providing the escort is the only person who can use the keys.

1.9. PRESCRIPTION DRUGS

1.9.1. Contractor employees who are required to take prescription medications during the work day are required to obtain authorization from the Director to bring a day's worth of medication into the facility.

1.10. TOBACCO USAGE RESTRICTIONS

1.10.1. Contractor employees are permitted to smoke outside the correctional facility.

1.10.2. Contractor employees who violate this policy will be asked to immediately cease smoking or discard any unauthorized tobacco products. If they persist, they will be asked to leave the facility.

1.10.3. Smoking is only permitted outdoors.

1.11. PROHIBITED ITEMS

1.11.1. Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on the premises.

1.11.2. If any prohibited items are found in the possession of any person on the work site, notify the Director immediately.

1.11.3. The Contractor must be vigilant in this regard with respect to its employees and subcontractors' employees. If prohibited items are found, the person who brought them in may be expelled. If the violation is serious, the company involved may be expelled from the establishment for the duration of the Work.

1.12. CONTACT WITH INMATES

1.12.1. Unless specifically authorized to do so, it is forbidden to enter into contact with inmates, talk to them, give them objects or receive anything from them. Violation of this policy will result in the removal of the employee involved from the facility and revocation of their security clearance.

1.12.2. It is prohibited to photograph offenders or CSC employees. It is also prohibited to photograph areas of the facility unless it is necessary for execution of the Work.

2. PRODUCTS

2.1. NOT USED.

3. EXECUTION

3.1. ACCESS TO THE FACILITY

3.1.1. Unless prior approval is granted by the Departmental Representative, contractor employees and commercial vehicles shall not be permitted on the premises after normal working hours.

3.1.2. The work week at the facility runs from Monday to Friday, generally from 8:00 am to 4:00 pm. Work hours vary from one facility to another. These should be verified with the facility involved.

3.2. DAILY WORK SCHEDULE

3.2.1. By noon each day, the Contractor shall email a daily work schedule for the following day to the Departmental Representative, so the Departmental Representative can coordinate the work with facility operations, security and other work in progress, and schedule security escorts required for supervision. The Contractor shall notify the Departmental Representative as soon as possible if there are any changes to the day's schedule, e.g., interruption or the need to extend work hours, etc.

3.3. VEHICULAR TRAFFIC

SPECIAL NOTE: Hours vary from one facility to another. It is therefore advisable to check with the facility involved.

3.3.1. The Contractor shall notify the Departmental Representative forty-eight (48) working hours before heavy equipment is scheduled to arrive.

3.4. MOVEMENT OF CONTRACTOR'S EMPLOYEES ON THE PROPERTY

3.4.1. Subject to the need for proper security, the Director shall allow the Contractor and its employees as much freedom of movement and autonomy of action as possible.

3.4.2. Notwithstanding the preceding paragraph, the Director may:

a) prohibit access to certain areas of the facility;

b) require that, during all or certain periods of work, Contractor employees be accompanied by a CSC security officer in designated areas.

3.5. EQUIPMENT AND ACCESSORIES REMOVED

3.5.1. Return all devices, fixtures, equipment, accessories or hardware that has been removed to the Departmental Representative for disposal or safekeeping for re-use. If authorized by the Departmental Representative, dispose of it responsibly.

3.6. MONITORING AND INSPECTION

3.6.1. The activities and movement of workers and vehicles are monitored and inspected by CSC safety personnel to ensure compliance with established safety standards.

3.6.2. At the start of and throughout the Work, CSC staff shall ensure that Contractor employees understand the need for monitoring and inspections.

3.7. WORK STOPPAGES

3.7.1. The Director may order that the Contractor, its employees, subcontractors or subcontractors' employees not enter or leave the work site immediately when a security incident occurs at the facility. Contractor employees shall note the name of the employee who issued the order and the time it was issued, and then execute the order as soon as practicable.

3.7.2. Upon receiving such an order, the Contractor shall notify the Departmental Representative immediately.

3.8. CLOSEOUT PROCEDURES

3.8.1. Unless otherwise specified, upon completion of the Work or, if applicable, when installations are handed over, the Contractor shall remove all materials, tools, and equipment from the facility, and perform a final cleanup of the premises.

END OF SECTION

Table of contents

Partie 1 General

GENERAL NOTE: In this section, the term "site" refers to all work site facilities and installations (work site itself, buildings, accesses, infrastructures, parking lots, docks, etc.).

1.1 RELATED REQUIREMENTS

.1 Section [_____].

1.2 REFERENCES

.1 Province of Quebec

.1 Act Respecting Occupational Health and Safety, CQLR c S-2.1

.2 Safety Code for the Construction Industry, CQLR c S-2.1, r 4

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00 – *Submittal Procedures*.

.2 Submit construction site-specific safety program to Departmental Representative and CNESST, as outlined in article entitled, "GENERAL REQUIREMENTS," at least ten (10) days prior to the start of Work.

.3 Departmental Representative will review Contractor's work site-specific safety program and provide comments to Contractor within ten (10) work days after receipt of plan. Revise plan as appropriate and resubmit safety program to Departmental Representative within five (5) days after receipt of comments from Departmental Representative. Departmental Representative reserves the right not to authorize start of Work on the work site until safety program is satisfactory. Review safety program during project and re-submit to Departmental Representative if any change occurs in scope of Work, work methods or for any other new applicable site conditions.

.4 Departmental Representative's review of Contractor's final work site-specific safety program should not be construed as approval and does not reduce Contractor's overall responsibility relating to health and safety during construction work.

.5 Submit Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly, at minimum.

.6 Submit copy of any inspection report, correction notice or recommendation issued by federal, provincial or territorial inspectors to Departmental Representative within twenty-four (24) hours.

.7 Submit an investigation report for any accident involving injury and any incident exposing a potential hazard to Departmental Representative within twenty-four (24) hours.

The investigation report shall at least include the following:

1. Date, time and location of the accident
2. Name of subcontractor involved in the accident
3. Number of people involved and condition of those injured
4. Identification of witnesses
5. Detailed description of tasks being performed when accident occurred
6. Equipment used to perform tasks when accident occurred
7. Corrective measures implemented immediately following accident
8. Accident cause(s)
9. Preventive measures implemented to prevent a similar accident from recurring

.8 Submit WHMIS Safety Data Sheets (SDS) to Departmental Representative in accordance with Section 01 33 00 – *Submittal Procedures,* Section 01 47 15 – *Sustainable Requirements: Construction* and Section 02 81 01 – *Hazardous Materials*. Keep a copy of these sheets on the work site.

.9 Medical surveillance: Where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work on the work site. Submit additional certification for any new employee beginning work on work site to Departmental Representative.

.10 Submit Emergency Response Plan to Departmental Representative at same time as Safety Program. Include in Emergency Response Plan all components listed in article entitled, “GENERAL REQUIREMENTS” of this section.

.11 Submit copies of training certificates for work site workers to Departmental Representative, most specifically the following, as applicable:

.1 Workplace first aid and cardiopulmonary resuscitation
.2 Work likely to create asbestos dust emissions (required for any work taking place where asbestos is present)
.3 Work in confined spaces (required for all work in confined spaces)
.4 Lockout/tagout (required for all work requiring lockout/tagout)
.5 Safe forklift driving (required for any use of forklifts)
.6 Safe driving of lift platforms (required for any use of lift platforms)
.7 Any other training required under regulations or Safety Program

Furthermore, *Cours de santé et sécurité générale pour les chantiers de*

construction (General work site health and safety course) certifications shall be available at work site upon request.

.12 Engineer's plans and certificates of compliance: submit copies of all plans and certificates of compliance to Departmental Representative and *Commission des normes, de l'équité, de la santé et de la sécurité du travail* (CNESST), signed and stamped by an engineer, as required by the *Safety Code for the Construction Industry* (S-2.1, r 4), any other legislation or regulation, or by any other clause in Specifications or this Contract. Also submit a certificate of conformity signed by an engineer once installation for which the plans were developed has been completed and prior to anyone using the installation. Ensure copies of these documents are on hand at work site at all times.

1.4 FILING OF NOTICE OF CONSTRUCTION SITE OPENING

.1 Send notice of construction site opening to CNESST prior to start of Work. Submit a copy of notice of site opening and CNESST's acknowledgement of receipt to Departmental Representative.

During demobilization, submit a notice of site closing to CNESST, with a copy to Departmental Representative.

.2 Assume role of Principal Contractor at all times within work site boundaries and wherever Work of this project is performed. Contractor shall accept responsibilities as Principal Contractor and identify itself as such in notice of construction site opening sent to CNESST.

.3 Contractor shall agree to install proper work site separation and identification in order to maintain time and space at all times throughout life of project.

1.5 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.6 MEETINGS

.1 Schedule and administer health and safety meeting with Departmental Representative prior to start of Work.

.2 Contractor's decisional representative shall attend all meetings at which work site safety and health issues are to be discussed.

.3 If there will be twenty-five (25) or more workers on work site at any given time during Work, set up a work site safety committee and convene meetings as required by *Safety*

Code for the Construction Industry (S-2.1, r 4). Submit copy of work site safety committee meeting minutes to Departmental Representative within five (5) days after meetings.

1.7 LEGAL AND REGULATORY REQUIREMENTS

.1 Perform Work in accordance with Section 01 41 00 – Regulatory Requirements.

.2 Comply with all laws, regulations and standards applicable to execution of work.

.3 Comply with specified standards and regulations to ensure work can be carried out normally at site contaminated by hazardous or toxic materials.

.4 Regardless of publication date cited in the *Safety Code for the Construction Industry* (S-2.1, r 4), always use most recent version.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with *An Act Respecting Occupational Health and Safety* (CQLR, c. S-2.1), and *Safety Code for the Construction Industry* (S-2.1, r 4), as well as all requirements set forth in these Specifications.

1.9 RESPONSIBILITIES

.1 Accept and perform all tasks and requirements normally expected of Principal Contractor under *Regulation respecting occupational health and safety* (CQLR c S-2.1) and *Safety Code for the Construction Industry* (S-2.1, r 4).

.2 Assume responsibility for health and safety of persons on work site, safety of property on work site and protection of persons adjacent to work site as well as the environment if affected by conduct of work.

.3 Regardless of work site size and location, clearly define boundaries of such using physical means; comply with specific related regulatory requirements. Submit means chosen to define work site to Departmental Representative.

.4 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with work site-specific safety program.

1.10 WORK PERFORMED BY EXTERNAL CONTRACTORS

.1 On this work site, it is anticipated that the following work will be performed by an external contractor not hired by Contractor:

.2 Implement whatever measures necessary to protect health and safety of external contractors not bound to Contractor by contract but mandated by Departmental Representative to perform certain work. In return, external contractors are obligated to submit to Contractor's (as principal contractor) authority. Each external contractor shall be required to sign a subordination agreement to that effect with Contractor, which will be submitted to Departmental Representative before external contractors begin any work. (Refer to wording in article entitled, "OHS SUBORDINATION AGREEMENT.")

1.11 GENERAL REQUIREMENTS

.1 Prior to undertaking work, prepare a work site-specific safety program based on prior safety assessment in accordance with articles entitled, "SAFETY ASSESSMENT" and "RISKS INHERENT TO WORK SITE" in this section. Implement, maintain, and enforce safety program in its entirety until final demobilization from work site. Ensure Safety Program takes into account all specific characteristics of the project and covers all work performed on site.

Include at least the following elements in Safety Program:

.1 Company's health and safety policy
.2 Description of work stages
.3 Total cost of work, schedule and projected workforce curve
.4 Flow chart of safety and health responsibilities
.5 Physical and material layout of the work site
.6 Identification of risks at each stage, corresponding preventive measures and conditions for application
.7 Identification of preventive measures in terms of risks inherent to working environment indicated in article entitled, "RISKS INHERENT TO WORK SITE"
.8 Identification of preventive measures relating to employee and/or public health and safety at work site, as stipulated in article entitled, "SPECIFIC REQUIREMENTS FOR HEALTH AND SAFETY OF OCCUPANTS AND THE PUBLIC"
.9 Required training
.10 Procedure in case of accident/injury
.11 Written commitment from all parties to comply with Safety Program
.12 Work site inspection checklist, based on preventive measures

.13 Emergency Response Plan, containing at least following elements:

.1 Work site evacuation procedure

.2 Identification of resources (police, firefighters, ambulance services, etc.)

.3 Identification of persons in charge at work site

.4 Identification of those with first-aid training

.5 Communications chart (including person responsible on site and Departmental Representative)

.6 Training required for those responsible for applying plan

.7 Any other information needed, in light of work site characteristics

Departmental Representative will send site evacuation procedure to Contractor, if applicable; Contractor shall combine work site procedure with site procedure and submit to Departmental Representative.

.2 Departmental Representative may respond in writing where deficiencies or concerns with safety program are noted, and may request re-submission with correction of deficiencies or concerns.

.3 In addition to safety program, during work or at Departmental Representative's request, develop and submit a specific written procedure to Departmental Representative for any work with high accident risk (e.g.: demolition procedure, specific installation procedure, hoisting plan, written confined space entry procedure, power interruption procedures, etc.).

.4 Plan and organize work so as to eliminate hazards at source or promote mutual protection so that reliance on personal protective equipment can be kept to a minimum.

.5 Equipment, tools and protective equipment that cannot be installed, fitted or used without compromising the health or safety of workers or the public are inadequate for Work to be executed.

.6 Inspect all mechanical equipment prior to delivery to work site (e.g.: fixtures for lifting people or materials, backhoes, concrete pumps, concrete saws, etc.). Obtain and keep on site an inspection certificate signed by a mechanic and dated less than one week prior to any equipment's arrival to work site; submit to Departmental Representative upon request.

.7 Ensure all inspections (daily, periodic, annual, etc.) of equipment for lifting persons or materials, as required by standards in force, are performed and submit copies of inspection certificates at Departmental Representative's request.

.8 Whenever a defect or accident risk is suspected, Departmental Representative may at any time order immediate shut-down of equipment and require a new inspection by a specialist of own choosing.

.9 Departmental Representative may be consulted regarding location of gas cylinders and tanks on the work site.

1.12 RISKS INHERENT TO WORK SITE

.1 In addition to risks associated with tasks to perform, employees mandated with Work on work site will be exposed to following risks, inherent to specific location where Work will be performed.

At location where work will take place, the following will be present:

.1 Materials containing asbestos
.2 Materials containing lead
.3 Mould
.4 Other hazardous materials (specify)
.5 Confined spaces
.6 Overhead power lines
.7 Underground utilities (electrical, gas, steam, water, etc.)
.8 Laboratories
.9 Trees and landscaping to preserve and protect
.10 Potentially unstable soils
.11 Barbed wire fences
.12 Body of water nearby
.13 Other to be specified
.14 Other to be specified
.15 Other to be specified

Perform a risk assessment on-site to validate this information and whether other risks are present.

Include all identified risks in safety program.

1.13 SPECIFIC REQUIREMENTS FOR HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC

.1 Site where Work will take place is occupied by employees and/or public during following periods: [specify periods], although these persons will not have access to the Contractor's site: Take following specific requirements into account regarding protection of employees and/or public:

.1 [ ]
.2 [ ]
.3 [ ]

Include these requirements in Safety Program, along with all other measures planned to ensure health and safety of employees and/or public present on site.

1.14 UNFORESEEN HAZARDS

.1 When a hazard not stipulated in Contract Documents and not identified upon preliminary work site inspection arises because of or during execution of Work, immediately stop all Work, notify person responsible for work site health and safety, implement temporary protective measures for workers and public, and notify Departmental Representative verbally and in writing. Then make all necessary modifications to safety program necessary to safely resume work.

1.15 PERSON RESPONSIBLE FOR HEALTH AND SAFETY

.1 If work site meets criteria set forth in Article 2.5.3 of the *Safety Code for the Construction Industry* (S-2.1, r 4), hire a qualified and authorized person as safety officer assigned full-time, from start of Work. This person's tasks must be exclusively dedicated to health and safety management on work site. Safety officer shall meet following criteria:

.1 Held a valid CNESST safety officer certification for a minimum of five (5) years
.2 Work site-related working experience specific to project-related activities
.3 Working knowledge of occupational safety and health regulations
.4 Responsible for completing Contractor's health and safety training sessions and ensuring that personnel not successfully completing required training are not permitted to enter work site to perform Work
.5 Responsible for implementing, enforcing daily and monitoring Contractor's work site-specific health and safety plan.
.6 Present on work site at all times during execution of work
.7 Inspect work and ensure all regulatory requirements as well as those set out in Contract Documents or safety program are met
.8 Maintain daily log of their actions and submit a copy to Departmental Representative at least once a week

Submit safety officer's certification to Departmental Representative prior to start of Work.

.2 When hiring a safety officer is not required or if said officer is hired by Departmental Representative, appoint a competent person to supervise and be responsible for health and safety, regardless of work site size or number of workers present. This person must be present at all times on work site and be able to take whatever measures necessary to ensure health and safety of persons and property at or in immediate vicinity of the site, as well as those who could be affected by Work. Submit name of this person to Departmental Representative prior to start of Work.

1.16 POSTING OF DOCUMENTS

.1 Ensure applicable documents, articles, notices and orders are posted in conspicuous location on site in accordance with acts and regulations of Quebec, and in consultation with Departmental Representative.

.2 At least following information and documents must be posted in a location that is readily accessible to all workers:

.1 Notice of work site opening
.2 Identification of Principal Contractor
.3 Company OHS policy
.4 Site-specific Safety Program
.5 Emergency Response Plan
.6 Minutes of work site committee meetings
.7 Names of work site committee representatives
.8 List of first responders
.9 Action reports and correction notices issued by CNESST

1.17 INSPECTIONS AND CORRECTIVE ACTIONS IN EVENT OF NON-COMPLIANCE

.1 Inspect work site, complete work site inspection checklist and submit to Departmental Representative in accordance with article entitled, “ACTION AND INFORMATIONAL SUBMITTALS” in this Section.

.2 Immediately address health and safety non-compliance issues identified during inspections stipulated in previous paragraph or by authority having jurisdiction or by Departmental Representative.

.3 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.4 Give safety officer or, where there is no safety officer, person assigned to health and safety responsibilities, full authority to order interruption and resumption of work when deemed necessary or desirable in the interests of health and safety. Safety officer to

ensure that health and safety of the public and work site workers as well as environmental protection always take precedence over cost and scheduling considerations.

.5 Departmental Representative may order work to be stopped if non-compliance of health and safety regulations is not corrected. Without limiting the foregoing, Departmental Representative may order cessation of work if, in their view, there is any hazard or threat to health or safety of work site workers, public or environment.

1.18 VIOLENCE PREVENTION

.1 Health and safety management on Public Works and Government Services Canada work sites includes implementation of measures to protect the psychological health of all persons who access the site where Work takes place. Thus, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the site. Any person who commits such acts or behaviours shall be given a warning and/or could be expelled from the work site indefinitely by the Departmental Representative.

1.19 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

.2 Blast in accordance with Section 31 23 16.26 – Rock Removal.

.3 Any operation involving explosives shall be carried out under immediate supervision of a qualified blaster.

.4 Ensure purchase, transportation, storage and use of explosives comply with provisions of applicable federal and provincial laws:

.1 Canada: *Explosives Act* (E-17), *Explosives Regulations* (C.R.C., c. 599), Standard for Storage of Blasting Charges and Detonators, *Transportation of Dangerous Goods Act and Regulations*.

.2 Québec: *Act respecting Explosives* (E-22), *Regulation under the Act respecting Explosives* (E-22, r 1), *Safety Code for the Construction Industry* (S-2.1, r 4), *Transportation of Dangerous Substances Regulation.*

.5 Contractor shall obtain all permits required under the above laws and regulations and keep a copy readily available at the work site.

.6 Work site, explosives storage areas and vehicles used to transport explosives are subject to inspection by government officials and police officers having jurisdiction over explosives. Contractor shall facilitate such inspections.

1.20 POWDER-ACTUATED DEVICES

.1 Use powder-actuated devices only after receipt of written permission from Departmental Representative.

.2 Any person using an explosive-actuated gun shall hold a training certificate and meet all requirements set forth in Section 7 of the *Safety Code for the Construction Industry* (S-2.1, r 4).

.3 Use any other explosive-actuated device in accordance with manufacturer's directions and applicable standards and regulations.

1.21 USE OF PUBLIC THOROUGHFARES

.1 Where it is necessary to encroach on a public thoroughfare for operational reasons or to ensure the safety of workers, occupants or public (e.g.: use of scaffolding, cranes, digging work, etc.), obtain and assume costs for any authorizations and permits required by authority having jurisdiction.

.2 Install and assume costs for any signage, barricades or other devices required by regulations for the safety and security of the public and Contractor's facilities.

1.22 LOCKOUT

.1 For any work performed on equipment powered by electricity or any other energy source, submit a general lockout procedure to Departmental Representative and ensure it is applied.

.2 Supervisory staff and workers affected by work requiring lockout must have been trained by a recognized organization on lockout procedures; submit training certifications to Departmental Representative.

.3 Before locking out equipment on an occupied site, coordinate work with site representative if power cut-off could affect site operations or occupants.

.4 Identified a qualified person as responsible for lockout and ensure that the said person prepares a lockout sheet for each piece of equipment that must be locked out. Submit lockout sheet to Departmental Representative at least forty-eight (48) hours before start of work; Departmental Representative shall have a site representative verify it if work is to take place in an existing building. Lockout sheet shall contain at least the following information:

.1 Description of work to be done

.2 Identification, description and location of circuit and/or equipment to lockout

.3 Identification of energy sources powering equipment

.4 Identification of each cut-off point

.5 Lockout and residual energy release procedure as well as unlocking procedure

.6 List of required lockout equipment

.7 Zero energy verification method

.8 Name and signature of person who prepared the sheet

Enter all of this information on the site representative's form, at Departmental Representative's request.

.5 When lockout procedure is performed, person responsible shall date the sheet and ensure each worker involved in work on locked out circuit/equipment writes their name on the sheet and signs it.

1.23 ELECTRICAL WORK

.1 Ensure all electrical work is performed by qualified employees in accordance with provincial regulations regarding professional qualifications and training.

.2 Comply with requirements set forth in standard CSA Z462, *Workplace Electrical Safety.*

.3 Any work on an electrical device shall be done when it is powered off unless it is impossible for it to be completely disconnected.

.4 Comply with all requirements set out in paragraph entitled, "Lockout" in this section.

.5 Notify Departmental Representative in writing and obtain their approval for any work that cannot be performed when an electrical device is powered off. Demonstrate to Departmental Representative that it is impossible to perform work when it is powered off and provide all necessary information to complete and obtain a permit for live work (work method, electrical arc assessment, perimeter of protection, protective equipment, etc.) prior to start of work, except in exceptional unforeseen cases set forth in CSA Z462 standard, Workplace Electrical Safety.

.6 The permit to work live shall at least include the following:

a. Description of circuit, equipment and location

b. Justification of need to perform live work

c. Description of safe work practices to use

d. Conclusions of electric shock hazard analysis

e. Definition of perimeter for protection against electric shock

f. Conclusions of arc flash hazard analysis

g. Definition of perimeter for protection against arc flash

h. Description of required personal protective equipment

i. Description of means to restrict access by unqualified persons

j. Proof that an information session took place

k. Signature of approval for live work (by an authority or owner)

.7 If, for needs relating to site occupants' operations, site representative requires Contractor to perform live work, provide all necessary information to complete and obtain a permit for live work (work method, electrical arc assessment, perimeter of protection, protective equipment, etc.) and have site representative appointed by Departmental Representative sign it prior to start of Work.

1.24 EXPOSURE TO ASBESTOS

It is not anticipated that Work addressed in these Specifications will involve handling materials containing asbestos; however if Contractor, Departmental Representative or their agent discover materials that may contain asbestos, immediately stop work and notify Departmental Representative. If it is subsequently demonstrated that these materials do indeed contain asbestos, comply with requirements listed below.

Before starting any work that could produce asbestos dust, Contractor shall:

1. provide a written work procedure identifying level of risk for work (low, moderate, high) as defined in Section 3.23 of the *Safety Code for the Construction Industry* S-2.1, r 4, taking into account all requirements in said section.
   a.

2. Submit certificates demonstrating that all workers involved in work were properly trained regarding risks associated with asbestos and procedure stipulated in previous paragraph.

3. Demonstrate that all materials and equipment necessary to comply with procedure and safely execute Work are in hand.

1.25 FUNGAL DECONTAMINATION

It is not anticipated that Work addressed in these Specifications will involve handling materials contaminated with mould; however if Contractor, Departmental Representative or their agent discover materials that may be contaminated with mould, immediately stop work and notify Departmental Representative. If it is subsequently demonstrated that these materials do indeed contain mould, comply with requirements listed below.

Before start of work that is likely to expose workers to contact with materials contaminated with mould:

1. Provide a written work procedure in accordance with requirements set forth in *Safety Code for the Construction Industry, S-2.1, r 4* as well as those indicated in document entitled, *"Mould Guidelines for the Canadian Construction Industry"* published by the Canadian Construction Association (http://documents.cca-acc.com/documents/electronic/cca82/cca82.asp).

2. Demonstrate that all materials and equipment necessary to comply with procedure and safely execute Work are in hand.

1.26 EXPOSURE TO SILICA

For any interior or exterior work generating silica, comply with following requirements, in addition to those in the *Safety Code for the Construction Industry* (S-2.1, r 4).

1. Work in a damp environment or using tools that use water to control dust or capture dust at the source and hold them in a high-efficiency filter to ensure they are not released into the environment.

2. Clean surfaces and tools with water, never compressed air.

3. Sand and strip surfaces using an abrasive containing less than 1% silica (also called amorphous silica).

4. Install screens or partitions to prevent dust from migrating outside work zone, thus protecting other workers and the public.

5. Wear personal respiratory and eye protection during operations likely to produce silica dust, in accordance with requirements set forth in *Safety Code for the Construction Industry, S-2.1, r 4.*

6. Wear a protective suit to prevent contamination off-site.

7. Do not eat, drink or smoke in a dusty environment.

8. Workers should wash hands and face before eating, drinking or smoking.

1.27 SAND BLASTING

Before beginning any sandblasting work:

1. Provide a written work procedure in accordance with requirements set out in Section 3.20 of the *Safety Code for the Construction Industry, S-2.1, r 4*.

2. Demonstrate that all materials and equipment necessary to comply with procedure and safely execute Work are in hand.

3. Perform sandblasting and stripping using an abrasive containing less than 1% silica.

1.28 LEAD-BASE PAINT ABATEMENT

Before start of work that is likely to expose workers to contact with materials contaminated with lead paint or other lead-based substances:

1. Provide a written procedure in accordance with requirements set out in *Safety Code for the Construction Industry, S-2.1, r 4* as well as those indicated in document entitled, *"Guideline for Lead on Construction Projects"* published by the Ontario Ministry of Labour (http://www.labour.gov.on.ca/english/hs/pdf/gl_lead.pdf). In the event of divergence between Québec regulations and the Ontario document, the more stringent requirement shall take precedence.

2. Demonstrate that all materials and equipment necessary to comply with procedure and safely execute Work are in hand.

1.29 EXPOSURE TO ANIMAL DROPPINGS

Prior to starting any work where workers are likely to be in contact with materials contaminated by animal fecal droppings:

1. Provide a written procedure in accordance with requirements set forth in *Safety Code for the Construction Industry, S-2.1, r 4* as well as those indicated in document entitled, *"Des fientes de pigeons dans votre lieu de travail : méfiez-vous" (Pigeon droppings in your work environment:*

be mindful) published by the CNESST (http://www.csst.qc.ca/publications/100/Documents/DC100_1331_1web2.pdf in French only).

2. Demonstrate that all materials and equipment necessary to comply with procedure and safely execute Work are in hand.

1.30 RESPIRATORY PROTECTION

1. Ensure that all workers who must wear respiratory protection within the framework of their tasks have had proper training and undergone mask adjustment tests on their breathing apparatus, in accordance with standard CSA Z94.4, *"Selection, Use and Care of Respirators."* Submit mask fitting certifications to Departmental Representative upon request.

1.31 FALL PREVENTION

1. Plan and organize work so as to eliminate fall hazards at source or promote mutual protection so that reliance on personal protective equipment can be kept to a minimum. Where individual protection against falling is required, workers shall use safety harnesses that meet standard CAN/CSA – Z-259.10-M90. Safety belts may not be used as protection against falling.

2. Ensure anyone who uses a lifting platform (scissor lift, telescoping mast, articulated mast, rotating mast, etc.) has received appropriate training.

3. Safety harnesses are required whenever a lifting platform with telescoping, articulating or rotating mast is used.

4. Define a danger zone around each lift platform.

5. Any opening in the floor or on a roof must be surrounded by a guard rail or covered with a lid affixed to the floor and strong enough to withstand whatever load to which it may be subjected, regardless of the size of opening and height of fall it represents.

6. Anyone working within two metres of a location where a risk of falling three metres or more is present must use a safety harness in accordance with requirements and regulations, unless there is a guard rail or other type of component providing equivalent safety.

7. Despite regulatory requirements, Departmental Representative may require installation of a guard rail or use of a safety harness in certain specific situations that present a risk of falling less than three (3) metres.

1.32 SCAFFOLDING

Use scaffolding that meets *Safety Code for the Construction Industry* requirements, as well as the following:

Foundation

1. Install scaffolding on a solid foundation so that it does not slip or rock.
2. If scaffolding must be installed on a roof, roof overhang, canopy or gambrel roof, submit load calculations as well as plans signed and stamped by an engineer to Departmental Representative for authorization prior to beginning installation.

Assembly, cross-bracing and anchoring

1. Assemble, cross-brace and anchor all scaffolding in accordance with manufacturer's instructions and provisions set forth in the *Safety Code for the Construction Industry*.
2. Where a situation requires removal of part of the scaffolding (e.g., crosspieces), before assembling scaffolding, submit assembly procedure signed and stamped by an engineer to Departmental Representative, certifying that scaffolding assembled in manner described will allow work to be done safely under loads to which it will be subjected.
3. For scaffolding where span between two supports is greater than three metres, submit assembly plan signed and stamped by an engineer to Departmental Representative prior to assembling scaffolding.

Fall protection during assembly

1. During assembly, workers must be protected from falls at all times if they are exposed to a risk of falling more than three metres.

Platforms

1. Design and install scaffolding platforms in accordance with provisions set forth in *Safety Code for the Construction Industry.*
2. Only use planks approved and stamped in accordance with article 3.9.8 of the *Safety Code for the Construction Industry.*

3. Provide full platform covering entire surface of putlogs every three metres or fraction thereof when four or more sections of scaffolding are used (or height is at least six (6) metres); platform components shall not be moved at any time to create intermediate landings.

Guardrails

1. Install guardrails on every landing.
2. Cross-braces are not guardrails.
3. If platforms are not full, install guardrails above platform edge, ensuring there is no horizontal void between platform and guardrail.
4. Install guardrails on each landing and maintain in place until work is completed when four or more sections of scaffolding (or height is at least six metres) are used.

Access

1. Ensure access to scaffolding does not compromise worker safety.
2. Where scaffolding platforms are comprised of planks, install ladders in such a way that planks extending beyond platforms do not block the way up or down.
3. Notwithstanding provisions of the *Safety Code for the Construction Industry*, install steps on all scaffolding that has six or more rows of uprights or is six sections (or nine metres) high or higher.

Protection of public and occupants

1. When scaffolding is installed in a zone accessible to public, undertake whatever means necessary to prevent public from accessing scaffolding and, if applicable, work or storage area in vicinity of scaffolding.
2. Install covered walkways, nets or other similar fixtures to protect workers, public and occupants from falling objects. Obtain Departmental Representative's approval for protection method.

Engineer's plans

1. In addition to those required by the *Safety Code for the Construction Industry*, Departmental Representative reserves the right to require plans from an engineer for other scaffolding types or configurations.
2. A plan signed and stamped by an engineer is required for any scaffolding to which canvas, tarps or other materials that could get caught in the wind will be affixed.
3. A certificate of conformity signed by an engineer is required in cases where an engineer's plan is required and before anyone uses the installation for which plans are produced. Ensure copies of these documents are on hand at work site at all times.

1.33 CONFINED SPACES

In addition to complying with provincial regulations that apply to confined spaces, ensure requirements iterated in paragraphs below are met.

Departmental Representative reserves the right, depending on nature of risks inherent to confined space and/or Contractor's level of competency for working in confined spaces, to require Contractor to use the services of a firm specializing in health and safety or confined spaces to analyze risks inherent to confined spaces in question, fill out entry permit, supervise work or perform any other task relating to working in confined spaces.

Information on confined spaces on site

1. The non-exhaustive list below indicates confined spaces Contractor may need to access for Work during this Project:

   List of confined spaces

2. Consider each confined space and add any other confined space likely to be built/installed during this Project.

Person responsible for health and safety for work in confined spaces

1. Appoint a person responsible for health and safety for work in confined spaces. Ensure person meets qualifications listed in Article 297 of the *Regulation respecting occupational health and safety* (S-2.1, r 13). Ensure that person is present at all times when work in confined spaces takes place and that all regulatory requirements, as well as those stipulated in this Section are met. This person is also responsible for filling out and issuing confined space entry permits.

Training

1. Person responsible for work in confined spaces, those who access confined spaces as well as confined space attendants shall have received appropriate training on entering confined spaces.

2. Those who use self-contained breathing apparatus to access confined spaces shall have received appropriate training on using such devices.

3. Anyone identified as a confined space rescuer shall have received confined space rescue training.

4. All required training stipulated above shall be given by a firm specializing in health and safety or confined spaces.

5. Submit training certificates for people listed above to Departmental Representative prior to starting work in a confined space.

Confined space risk assessment

1. Obtain necessary information from Departmental Representative regarding each confined space listed at beginning of this Section, in order to proceed with assessing risks inherent to each one, relating to:
   a. prevalent internal atmosphere, i.e. concentration of oxygen, flammable gases and vapour, combustible dust presenting a risk of fire or explosion, as well as all categories of contaminants most likely to be present in or in vicinity of said confined space;
   b. lack of natural or mechanical ventilation;
   c. materials present that could collapse on, bury or drown workers, such as sand, grain or a liquid;
   d. internal configuration;
   e. pipes and ducts opening into confined space;
   f. energy sources such as electricity, moving mechanical parts, thermal constraints, noise and hydraulic energy;
   g. ignition sources, such as open flames, lighting, welding and cutting, static electricity or sparks;
   h. any other specific circumstance such as presence of vermin, rodents or insects.

   Ensure person responsible for health and safety for work in confined spaces conducts this risk assessment. Submit risk assessment to Departmental Representative for review at least ten (10) days prior to planned confined space entry date, and include following information:
      a. Location of confined space
      b. Description of confined space
      c. Dimensions of confined space
      d. Number, location and size of openings
      e. Contents of confined space (equipment, substances, etc.)
      f. Assessment date
      g. Name, signature and employer of person who performed risk assessment

Perform same procedure for each confined space built or installed during this Project.

Confined space entry permit

1. At least five (5) days before planned date of confined space work, submit one (1) copy of each permit specific to confined spaces to be accessed to Departmental Representative for review. Ensure person responsible for health and safety for work in confined spaces completed entry permits, and that they contain at least the following information:
      a. Description of work to be carried out along with work method, equipment and tools required

b. Description of risks, corresponding control measures according to results of assessment of risks inherent to confined space performed beforehand and risks inherent to work to be performed
c. Safety equipment that will be used to control risks in confined space (e.g.: fan, gas sensor, exhaust at source, personal protective equipment, etc.)
d. Rescue procedure containing at least following components:
    i. Method of communication between confined space attendant and workers inside confined space
    ii. Rescue equipment specific to each confined space
    iii. Confirmation that municipal emergency services were notified that work in confined space on that specific work site will be taking place and that they can intervene and rescue inside a confined space; if that is not the case, identify workers on site who will act as rescuers if they need to perform a rescue inside a confined space (rescue training required)
    iv. Location of phone and phone number for municipal emergency services (if applicable)
e. Date of entry permit
f. Name of person issuing permit, as well as their employer
g. Name of attendant and their employer
h. Name of each worker who must enter confined space, as well as their employer

2. If Departmental Representative requires use of a site-specific confined space entry permit, comply with requirements of this permit.

Medical surveillance

1. Submit medical certificate to Departmental Representative issued within no more than two years for each person required to use air-supplied respiratory protection. Certificate shall confirm holder's ability to use this type of apparatus.

2. It is recommended that anyone required to work in sewer collection or other similar types of systems be vaccinated against diphtheria, tetanus and Hepatitis B.

Requirements during work in confined spaces

1. Before entering a confined space, ensure person responsible takes readings to determine concentration of oxygen, flammable gases and any other toxic gases likely to be present and records those readings on entry permit stipulated above.

2. Workers may only access a confined space if following requirements have been met:
    a. Oxygen concentration is greater than or equal to 19.5% and less than or equal to 23%.
    b. Concentration of gas or flammable fumes is equal to or less than 10% of lower explosive limit.

c. Concentration of other gases does not exceed standards stipulated in Appendix I of the *Regulation respecting occupational health and safety* (S-2.1, r 13).

3. If oxygen and gas concentrations measures meet regulatory values, person responsible shall ensure that all preventive measures indicated on permit have been implemented and then finish filling out entry permit (date, time, signatures, etc.) before issuing permit and allowing access to confined space.

4. Entry permits may only cover a single work shift; issue a new permit for each additional work shift.

5. Measure gas concentration continuously during work inside a confined space, ensuring sensor is installed at same level as workers' breathing zone. If prevalent conditions inside confined space are such that workers cannot hear/see the sensor alarm, find a method for confined space attendant to monitor concentration levels while maintaining continuous measurement in workers' breathing zone.

6. If work takes place such that workers may not be near one another in a large confined space, provide additional gas sensors.

7. Supply gas sensors and maintain in good working condition. Ensure it is possible to demonstrate that gas sensors used were calibrated and adjusted by person responsible or qualified person, and according to manufacturer's recommendations. Departmental Representative may require verification of accuracy of Contractor's devices at any time. If a sensor fails, suspend work immediately and evacuate workers from confined space.

8. Keep manufacturer's manual for gas sensor available on site.

9. Provide ventilation system with sufficient capacity to maintain concentration of contaminants below regulatory concentration levels.

10. If work generating contaminants in air takes place (welding, use of products, etc.), provide a contaminant exhaust system to ensure regulatory air quality values are maintained at all times.

11. If a gas sensor alarm sounds, evacuate all employees from confined space. Record concentration level readings on entry permit. Identify source of contamination, neutralize it, ventilate confined space to eliminate residual contaminants and prohibit access to confined space until oxygen and gas level concentrations have returned to normal.

12. Ensure compressed gas cylinders and welding machines are kept outside confined spaces and do not block access to exit. Ensure cylinders are properly secured.

13. Ensure electrical equipment and tools used for work in confined spaces are properly grounded and, if necessary, explosion proof. Ensure such equipment and tools are connected to a step-down

transformer or circuit breaker in case of ground fault. Ensure power outlets and/or circuit breakers that will be used but do not meet this criteria are modified by a qualified electrician.

14. If confined space work includes hot work, obtain hot work permit and comply with relevant requirements.

15. Assign a qualified person to assume role of fire watch. Fire watch must be assigned exclusively to that role and remain outside confined space until all workers have exited. Fire watch must also:

    a. ensure entry permit has been completed, signed and posted next to confined space;
    b. know work procedure specific to confined space and ensure it is properly followed;
    c. maintain constant communication with all workers inside confined space and ensure equipment needed in case of emergency is in place;
    d. be familiar with make-up air ventilating systems and ensure proper operation throughout duration of work;
    e. prevent unauthorized persons from accessing confined space;
    f. ensure conditions of area surrounding confined space does not adversely affect health and safety of workers inside confined space;
    g. launch emergency response procedure if necessary;

16. Fire watch may also assume duties of Departmental Representative and person responsible for health and safety for work in confined spaces, as long as all requirements of both roles can be met.

1.34 DIGGING WORK

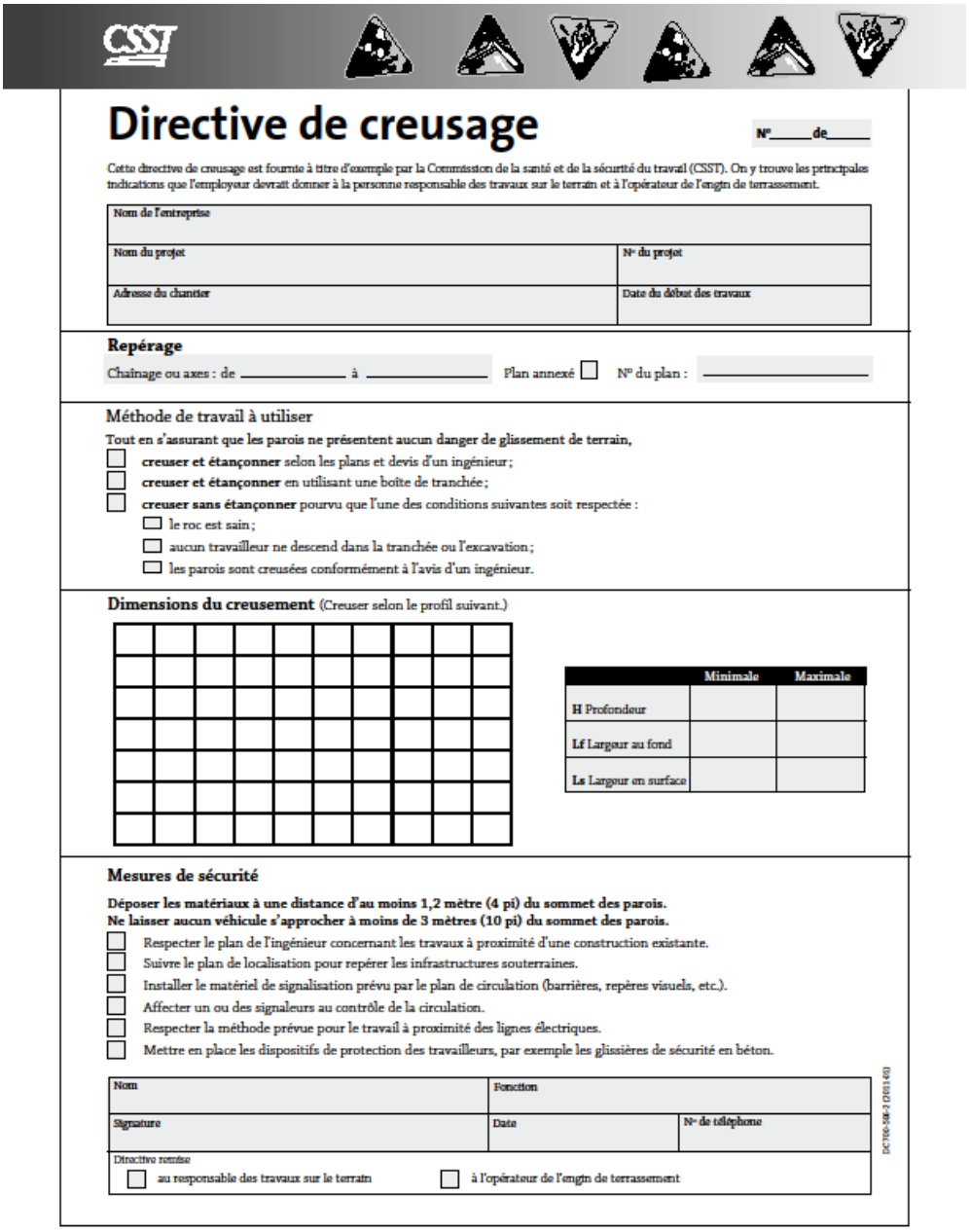
In addition to *Code de sécurité pour les travaux de construction* (Safety code for the construction industry) requirements, dig trenches and excavate to the following requirements:

1. Fill out the form below and submit it to Departmental Representative before beginning to excavation work.

2. Submit following documents to Departmental Representative, as appropriate:

    a. Plans and specifications, signed and stamped by an engineer, of shoring needed for excavation work; or

    b. Engineer’s advice specifying angles of trench or excavation walls.



CSST

Directive de creusage

N°_____de_____

Cette directive de creusage est fournie à titre d'exemple par la Commission de la santé et de la sécurité du travail (CSST). On y trouve les principales indications que l'employeur devrait donner à la personne responsable des travaux sur le terrain et à l'opérateur de l'engin de terrassement.

Nom de l'entreprise	
Nom du projet	N° du projet
Adresse du chantier	Date du début des travaux

Repérage

Chaînage ou axes : de _____ à _____ Plan annexé ☐ N° du plan : _____

Méthode de travail à utiliser

Tout en s'assurant que les parois ne présentent aucun danger de glissement de terrain,

- ☐ **creuser et étançonner** selon les plans et devis d'un ingénieur ;
- ☐ **creuser et étançonner** en utilisant une boîte de tranchée ;
- ☐ **creuser sans étançonner** pourvu que l'une des conditions suivantes soit respectée :
  - ☐ le roc est sain ;
  - ☐ aucun travailleur ne descend dans la tranchée ou l'excavation ;
  - ☐ les parois sont creusées conformément à l'avis d'un ingénieur.

Dimensions du creusement (Creuser selon le profil suivant.)

	Minimale	Maximale
H Profondeur		
Lf Largeur au fond		
Ls Largeur en surface		

Mesures de sécurité

Déposer les matériaux à une distance d'au moins 1,2 mètre (4 pi) du sommet des parois.
Ne laisser aucun véhicule s'approcher à moins de 3 mètres (10 pi) du sommet des parois.

- ☐ Respecter le plan de l'ingénieur concernant les travaux à proximité d'une construction existante.
- ☐ Suivre le plan de localisation pour repérer les infrastructures souterraines.
- ☐ Installer le matériel de signalisation prévu par le plan de circulation (barrières, repères visuels, etc.).
- ☐ Affecter un ou des signaleurs au contrôle de la circulation.
- ☐ Respecter la méthode prévue pour le travail à proximité des lignes électriques.
- ☐ Mettre en place les dispositifs de protection des travailleurs, par exemple les glissières de sécurité en béton.

Nom	Fonction	
Signature	Date	N° de téléphone
Directive remise		
☐ au responsable des travaux sur le terrain	☐ à l'opérateur de l'engin de terrassement	

DC700-58-3 (2011-03)

1.35 LIFTING LOADS WITH A CRANE OR CRANE TRUCK

1. Prepare a lifting plan, unless otherwise notified, and submit to Departmental Representative at least five (5) days before undertaking any lifting operations performed using a crane or crane truck. Include in this lifting plan, at minimum, information listed at end of this section.

2. Ensure hoisting plans are signed and stamped by an engineer for operations to lift:
   a. lifting concrete panels;
   b. mechanical/electrical equipment onto a roof or different storey in a building;
   c. lifting loads that encroach on a public thoroughfare;
   d. lifting large or heavy loads;
   e. all other lifting operations as required by Departmental Representative.

3. Other than the aforementioned requirements, plan lifting operations such that loads will avoid passing above occupied zones on the site. When it is impossible to do otherwise, lifting plan shall be signed and stamped by an engineer and guarantee the safety of occupants in the zone involved; plan shall also be approved by Departmental Representative. Departmental Representative may, if deemed necessary, require work to be performed at night or on weekends.

4. When work site work begins, submit the list of projected lifting plans to Departmental Representative for entire duration of the project. Update this list as necessary when changes are made during work.

5. In addition to mechanical service inspection certificate, annual inspection certificate and crane logbook must be onboard all crane and crane-truck cabs.

6. Define entire lifting area to prevent non-authorized people from entering it.

7. Carefully inspect all slings and lifting accessories; make sure those in poor condition are destroyed or disposed.

8. Lift compressed-gas cylinders with a basket specially designed for this purpose.

MINIMUM CONTENT OF HOISTING PLAN

- Sketch indicating, at minimum, location of crane, surrounding facilities, zone covered by hoisting operations, pedestrian pathways and vehicle routes, security perimeter, etc.
- Load weight
- Load dimensions
- List of lifting accessories and their respective weights
- Total weight to be lifted

- Maximum height of obstacles to clear
- Load lifting height as compared to roof surface (in event of loads to be deposited on roofs)
- Use of guide wires
- Type of crane used
- Crane capacity
- Boom length
- Boom angle
- Crane radius
- Extension of stabilizers
- Percentage of crane capacity used
- Confirmation that lifting equipment was inspected
- Identification of crane operator and person responsible for lifting operations with signatures and date

1.36 HOT WORK

Hot work refers to all work with an open flame or that could produce heat or sparks such as: riveting, welding, cutting, soldering, grinding, burning, heating, etc.

1. At start of each work shift and for each sector, obtain a “Hot work Permit” issued by person responsible for the site.

1. Keep a working portable fire extinguisher suitable for fire risk available and easily accessible within a 5 m radius of any flame or any source of spark or intense heat.

2. Appoint one person to continuously monitor risks of fire for a minimum of one (1) hour following end of all hot work. This person must sign relevant section of permit and submit it to the person responsible for the site after the said one (1) hour period.

3. When hot work is performed in areas where combustible materials are located or where walls, ceilings or floors are made of or covered with combustible materials, perform a final inspection of work area four (4) hours after end of work. Appoint one person to monitor in this way, unless otherwise notified by Departmental Representative.

Welding and cutting

In addition to requirements stipulated in previous paragraphs, comply with following requirements:

1. Perform welding and cutting work in accordance with requirements set out in the *Safety Code for the Construction Industry*, S-2.1, r 4, and CSA W117.2, *Safety in welding, cutting, and allied processes.*
2. Use an air exhaust system equipped with filters for all welding or cutting work performed indoors.
3. Interrupt any activity that produces flammable or combustible gas, vapours or dust near welding or cutting work taking place.
4. Store all compressed gas cylinders on fireproof fabrics and make sure that room is well ventilated.
5. Store all oxygen cylinders at least six (6) metres from any flammable gas cylinders (e.g.: acetylene) or combustible such as oil or grease, unless the oxygen cylinder is separated from such by a wall made of non-combustible material, as stipulated in article 3.13.4 of the *Safety Code for the Construction Industry*, S-2.1, r 4.
6. Store bottles far from all heat sources.
7. Store bottles away from staircases, exits, corridors and elevators.
8. To prevent risk of explosive reaction, ensure acetylene will not enter into contact with metals such as silver, mercury, copper and brass alloys with more than 65% copper.
9. Check that electric arc welding equipment has sufficient voltage and is properly grounded.
10. Ensure that electric welding equipment conducting wires are not damaged.
11. Place welding equipment on flat ground, covered/protected from elements.
12. Set up fireproof fabrics when welding is done overhead and there is risk of sparks falling.
13. Move combustible materials away or protect from welding equipment when less than fifteen (15) metres away.
14. Never weld or cut on a closed recipient.
15. Only cut, weld or perform work with an open flame on a container, tank, pipe or other container containing a flammable or explosive substance when:
    a. they have been cleaned and air samples have been taken and show no explosive vapours; and
    b. provisions have been implemented to ensure worker safety.

1.37 ROOFING WORK

Fall protection

1. Guardrails shall be installed in every instance; however, a warning line may be installed to delineate work zones, provided all requirements of Sections 2.9.4.0 and 2.9.4.1 of the *Safety Code for the Construction Industry* are met.
2. Guardrails shall remain in place until the very end of the project. Departmental Representative will authorize their dismantling when it can be confirmed that all required work, inspections and corrections have been completed.
3. A safety harness shall be worn when installing guardrails.
4. Safety harnesses shall be worn when it is necessary to temporarily move guardrails to install or modify parapets or flashing.
5. Safety harnesses shall be worn when standing at the edge of the drop-off to receive materials or signal the crane.
6. Safety harnesses shall be worn where collective protection does not offer adequate safety when working at the edge of the drop-off.
7. Contractor shall provide a method of attachment and emergency cable system in accordance with Section 2.10.12 of the *Safety Code for the Construction Industry (CQLR, S-2.1, r 4)* for each different sector or work location.

Lifting materials

1. For all winch installations, provide Departmental Representative with manufacturer-recommended installation method. If unavailable, provide an installation procedure signed and stamped by an engineer. Installation procedure shall take into account load bearing capacity, amount, weight and location of counterweight and any other detail that may affect device capacity and stability.
2. Carefully inspect all slings and lifting accessories; make sure those in poor condition are destroyed or disposed.
3. Lift compressed-gas cylinders with a basket specially designed for this purpose.
4. When using a crane or truck crane, comply with requirements set out in paragraph entitled, “Lifting loads with a crane or truck crane” in this section.

Protection against burns

1. Ensure hot pot workers wear long sleeves and safety glasses and a face shield when loading the hot pot.
2. People working with bitumen or other hot liquids shall wear gloves, long sleeves and safety glasses.

Fire protection

1. Store and use propane cylinders to *CAN/CSA-B149.2 – Propane storage and handling code*. Store cylinders outdoors, in a safe place, away from any unauthorized handling, in a storage cabinet specially designed for this purpose and in an area where no vehicles are allowed, unless cylinders are protected by barriers or other equivalent protective measures.

2. Number of propane cylinders on roof shall not exceed what is required for one day's work, and cylinders shall be secured upright or held vertically at all times in a cart designed for that purpose.

3. All hot work (burning, heating, riveting, welding, cutting, grinding, etc.) shall be performed in accordance with paragraph entitled "Hot Work" of this section.

Materials and waste management

1. On the roof, lightweight and sheet materials must be kept in containers or securely fastened. If this requirement is not met, Departmental Representative may prohibit storage of materials on the roof.
2. Waste shall be disposed of as it is generated, using a waste chute or in suitable containers. Provide means to prevent waste from blowing away.
3. Ensure all waste is removed from the roof at the end of each shift.
4. Unless specifically authorized by the Departmental Representative, all dumpsters shall be placed at least three (3) metres from any structure or building.

Protection of occupants and public

1. Install covered walkways, nets or other similar fixtures to protect workers, public and occupants entering or exiting the building from falling objects. Obtain Departmental Representative's approval for protection method.
2. Establish a ground safety perimeter beneath work area to protect workers, the public and occupants.
3. Ensure ground-level work area, material handling area, and area where hot pot is installed is clearly barricaded so occupants and public cannot access them.
4. Obtain authorization from site manager before installing any equipment that may emit gases or fumes. The site manager will ensure there is no risk of the gases or fumes infiltrating the building's ventilation systems.

1.38 ERECTION OR DISMANTLING OF STEEL STRUCTURES

.1 Comply with requirements stipulated hereunder, as well as Section 3.24 of *Safety Code for the Construction Industry* (S-2.1, r 4).

.2 Forward following documents to Departmental Representative before starting structural steel erection work:

.1 Erection procedure compliant with Section 3.24.10 of the *Safety Code for the Construction Industry* (S-2.1, r 4).

.2 Procedure for rescuing a worker suspended in a safety harness within fifteen (15) minutes, adapted to the work site and compliant with Section 3.24.4 of the *Safety Code for the Construction Industry*. This procedure must be accompanied by written confirmation that it has been tested.

.3 Engineer's certificate that anchor rods have been installed in accordance with anchoring plan, as required under Section 3.24.12 of *Safety Code for the Construction Industry*.

.4 Lifting procedure, where lifting is done in one of the ways specified in Section 3.24.15 of the *Safety Code for the Construction Industry.*

.5 Name of person identified as rescuer and that person's certification of rescue training.

.6 Name of person identified as first responder and that person's first responder training certificate.

.3 Ensure following documents are available at all times on work site for review:

.1 Structural steel manufacturer's erection diagram that meets requirements outlined in Section 3.24.9 of the *Safety Code for the Construction Industry* (S-2.1, r 4)

.2 Anchoring plan for pole anchor rods that meets requirements outlined in Section 3.24.11 of the *Safety Code for the Construction Industry* (S-2.1, r 4)

1.39 WORK NEAR A BODY OF WATER

1. For any work performed near a body of water (such as work above water, work on a wharf, work on shores of a body of water, etc.), comply with requirements stipulated hereunder, as well as the *Safety Code for the Construction Industry.*

2. Plan work to ensure that safety precautions preventing workers from falling in the water are implemented. Favour these safety precautions over wearing a life jacket.

3. Submit following documents to Departmental Representative before start of Work:

    a. Description of body of water
    b. Description of work performed in vicinity of this body of water
    c. Water transport plan adapted to work and characteristics of body of water
    d. Rescue plan adapted to work and characteristics of body of water

    Ensure each document contains at minimum the information stipulated in Section 11 of the *Safety Code for the Construction Industry*.

    All or part of Work may take place during the winter; adapt safety precautions included in documents required above accordingly.

4. Submit training certification required in Section 11.2 of the *Safety Code for the Construction Industry* to Departmental Representative for following persons:

    a. Person appointed to prepare documents stipulated in previous paragraph
    b. Each person responsible for transport or rescue operations

5. If rescue plan includes use of a boat, submit rescue workers' Transport Canada card or certificate of competence to Departmental Representative.

6. Include devices stipulated in Articles 11.4 and 11.5 of the *Safety Code for the Construction Industry* in weekly inspection checklist.

7. Ensure a rescue boat is moored in the water and available wherever a worker could fall in the water. One boat may serve several locations on same site as long as boat is within thirty metres (30 m) of each location.

8. When working environment is a landing dock, basin, jetty, wharf or similar structure, install ladders every sixty metres (60 m) with at least two (2) rungs above water surface on front of structure.

1.40 USE OF INTERNAL COMBUSTION ENGINES

1. Comply with requirements stipulated hereunder, as well as article 3.10.17 of the *Safety Code for the Construction Industry* (S-2.1, r 4).
2. Use of fuel-powered equipment inside a building is prohibited, even if building has openings.

3. Obtain Departmental Representative's authorization for indoor use of any other equipment with internal combustion engines.
4. When using equipment with internal combustion engines indoors, even if building has openings, install a ventilation system that ensures concentrations of toxic gases are kept below regulatory limits. Exhaust vitiated air outside the building.
    a. Before indoor use of equipment with an internal combustion engine, prepare following in writing:
    b. Number of fans to be installed
    c. Ventilation unit capacity
    d. Ventilation unit locations
    e. Size of openings that will remain open during work
5. When equipment with an internal combustion engine is running, measure carbon monoxide and nitrogen oxide concentrations in work zone at workers' breathing height; record concentrations every thirty (30) minutes in a logbook available for consultation.
6. If work takes place in an occupied building, also measure carbon monoxide and nitrogen oxide concentrations every thirty (30) minutes in rooms adjacent to work zone; record concentrations in a logbook.
7. If carbon monoxide or nitrogen oxide detector alarm goes off during work, suspend work and implement necessary corrective measures before resuming work.
8. Ensure a portable extinguisher is available in work zone at all times when using equipment with internal combustion engines.
9. Keep equipment at a safe distance from any combustible materials.
10. Store fuel for equipment with internal combustion engines outside.

1.41 TEMPORARY HEATING

1. Comply with requirements stipulated hereunder, as well as article 3.11 of the *Safety Code for the Construction Industry* (S-2.1, r 4).
2. Keep a portable extinguisher near heating units at all times, regardless of type of heating used.
3. Use equipment in accordance with manufacturer's specifications.
4. Solidly affix canvases and tarps used near heating devices to prevent them from blowing onto heating units, piping connected to heating units or any other heat source.

5. Install gas cylinders such that they are protected from vehicular traffic and other equipment.
6. Install carbon monoxide detectors in work zone near workers whenever non-electric heating units are used; maintain in operation whenever heating is used. Immediately implement necessary corrective measures for heating units when detector alarm sounds.
7. Ensure minimal supervision of heating units outside working hours (nights and weekends). Present supervision plan to Departmental Representative before using heating units.

1.42 WORK NEAR OVERHEAD POWER LINES

1. When there are overhead power lines in work zone and Contractor chooses to apply paragraph b) of Section 5.2.2 of the *Safety Code for the Construction Industry* (S-2.1, r 4), submit copy of agreement with electric company as well as work process stipulated in Article 5.2.2 b) to Departmental Representative before starting work associated with said documents.

1.43 DIVING OPERATIONS

In accepting this contract, Contractor agrees to fulfil following requirements:

1. Compliance with all requirements set out in *Regulation respecting occupational health and safety* (c S-2.1, r 19.1), most specifically Division XXVI.I entitled – *Underwater Work*. Compliance, furthermore, with most recent editions of CAN/CSA Z275.2 – *Occupational Safety Code for Diving Operations*, CAN/CSA Z275.1 – *Hyperbaric Facilities* and CAN/CSA Z275.4 – *Competency Standard for Diving Operations*. In the event of conflict between these requirements, the most stringent requirement applies.

2. In addition to provisions of previous paragraph, if construction work is performed, compliance with *Safety Code for the Construction Industry* (S-2.1, r 4).

3. Submit following documents to Departmental Representative prior to starting work, in accordance with the *Regulation respecting occupational health and safety*:
    a. Professional diving training certificate for each dive team member OR a document recognizing qualifications of such persons in accordance with Section 312.8 of CAN/CSA Z275.4-02 – *Competency Standard for Diving Operations*
    b. Workplace first-aid training certificate for each dive team member
    c. Medical certificate for each dive team member
    d. For each dive included in this mandate, a dive plan containing following information, in addition to that required under the *Regulation respecting occupational health and safety*:
        i. Thermal protection to be used
        ii. Repetitive dive factor

iii. No-decompression limit
iv. Circumstances requiring dive to be terminated
v. Procedures to be followed to ensure machinery, equipment or devices that could create a hazard have been locked out
vi. Decompression table to be used, as applicable

e. Notice confirming that system for communicating with medical assistance services for diving emergencies is available at the diving station at all times

4. Take following site-specific characteristics into account and adapt dive plan accordingly:

5. If dive takes place at one of following locations, provide Departmental Representative with confirmation that relevant authorities have been notified:
   a. Upstream or downstream from a hydraulic structure or submerged water line
   b. In navigable waterways
   c. In port facilities

6. If dive station is more than two (2) metres above water, submit following documents to Departmental Representative:
   a. Plan of equipment used to transport worker to water if something other than a platform is used for that purpose
   b. Plan of device used to hoist platform or other equipment, unless that device is a crane or boom truck

7. If dive is performed from a vessel, submit following documents to Departmental Representative:
   a. Proof of vessel operator's qualifications
   b. Vessel's certificate of conformity from Transport Canada

8. Prior to starting Work, simulate an underwater rescue on site, as required under Section 312.31 of the *Regulation respecting occupational health and safety.*

9. Complete and submit checklist to Departmental Representative daily, confirming presence and condition of equipment required on dive site, in accordance with dive plan.

10. Ensure all other documents required under Division XXVI of the *Regulation respecting occupational health and safety* are available at work site at all times (dive log, diver's log, etc.).

1.44 HEALTH AND SAFETY SUBORDINATION AGREEMENT

Project: _____ Address: _____

EXTERNAL CONTRACTOR

I hereby agree to submit to the authority of (name of the Principal Contractor's business) _____, the Principal Contractor for the project indicated above, for the entire duration of our work on the work site. I confirm that I have reviewed the Principal Contractor's Safety Program, and I agree to:

- inform my employees of the content of the Principal Contractor's safety program and ensure that its content is complied with at all times;
- apply the Safety Program that is specific to the activities that we carry out under this project;
- inform the Principal Contractor of my actions or dealings on the work site and obtain the Principal Contractor's agreement before starting work; and
- follow the health and safety directives provided by the Principal Contractor's representative on the work site and, depending on requirements, attend training sessions and health and safety meetings organized by the Principal Contractor's representative.

Name of representative: _____

Name of company: _____

Description of work to be done on the work site: _____

Approximate dates of work (start-end): _____

Signature: _____ Date: _____

PRINCIPAL CONTRACTOR

I hereby agree to allow (name of external contractor) _____ to perform the work for this project as indicated above and, as Principal Contractor, to take the necessary steps to protect the health and safety of workers on the work site. Should the contractor repeatedly refuse or fail to comply with my directives, I agree to inform PWGSC's Departmental Representative of such and to provide documentary evidence of my actions or dealings with the contractor.

Name of representative: _____

Name of the Principal Contractor's business: _____

Signature: _____ Date: _____

Submit duly completed and signed copy to PWGSC's Departmental Representative.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 SUMMARY

A. This section involves the following items:

1. Hoses, tubes and fittings.
2. Special fittings.

1.03 REFERENCES

A. ASTM:

1. ASTM D 2564-12: Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
2. ASTM D 2665-14: Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

B. CSA

1. CSA-B181.2 -15: Polyvinylchloride PVC and Chlorinated Polyvinylchloride (CPVC) Drain, Waste, and Vent Pipe and Pipe Fittings
2. CSA-B182.1-15: Plastic Drain and Sewer Pipe and Pipe Fittings

C. Québec

1. CCQ3: Québec Construction Code, Chapter III – Plumbing, and National Plumbing Code of Canada 2010 (amended)

1.04 ACTION SUBMITTALS

A. Technical product data: for each type of product indicated.

1.05 CLOSEOUT SUBMITTALS

A. Provide required operation and maintenance records for incorporation into manual specified in Section 01 78 00 – *Closeout Submittals*.

PARTIE 2 - PRODUCTS

2.01 PIPE MATERIALS

A. Comply with the requirements of the “Piping Schedules” section for the selection of pipe, tubing and fitting materials, as well as jointing methods for specific services, service locations and pipe sizes.

2.02 PLASTIC PIPE AND FITTINGS

A. PVC DWV pipes that meet following standards:

1. CSA-B181.2
2. CSA-B182.1

B. Glued joints

1. Solvent weld for PVC: to ASTM D2564.

PARTIE 3 - EXECUTION

3.01 PIPING INSTALLATION

A. Install components in accordance with requirements set out in the CCQ3, as well as those of local authorities having jurisdiction.

B. Unless otherwise indicated and except for mechanical rooms and service spaces, install piping so it is concealed.

C. When installing piping, prevent sagging and bending.

D. Unless otherwise indicated, install drain and vent piping with the following minimum slopes:

1. Sanitary sewer draining in buildings: 2% downward slope in direction of flow for pipe with nominal size of DN 80 (NPS 3) or less; 1% downward slope in direction of flow for pipe with nominal size of DN 100 (NPS 4) or more.

E. Install gaskets in sleeves where piping passes through a wall.

F. Install escutcheons where piping passes through a wall, ceiling or floor.

1. Comply with the escutcheon requirements of Section 22 05 00 – *Common Work Results for Plumbing*.

3.02 JOINTS

A. Solvent-cemented joints on plastic gravity drainage pipes: clean and dry surfaces to be joined. Assemble the pipes and fittings according to the following instructions:

1. Follow the requirements of ASTM F 402 pertaining to safe handling of solvent-based cleaners, primers and adhesives.
2. PVC piping: assemble to ASTM D 2855 and ASTM D 2665.

3.03 STORAGE AND PROTECTION

A. Clean inside of pipes. Remove dirt and debris as work progresses.

B. Cap off any unfinished pipe at end of day or when work is stopped.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 REFERENCES

A. Québec

1. CCQ: Québec Construction Code – Chapter I – Building, and National Building Code of Canada 2010 (amended)

1.03 QUALITY ASSURANCE

A. Work of Division 23 to be performed by qualified personnel with competency cards.

1.04 CONCEALED STRUCTURES

A. Unless otherwise indicated, conceal pipes, ducts and wiring in walls and ceilings of finished areas.

B. Prior to closing walls, floors and ceilings concealing pipes, ducts and wiring, notify Engineer so required inspections can be performed.

1. When this requirement is not met, and at the Engineer's request, uncover work for inspection and patch without compensation.

PARTIE 2 - PRODUCTS

2.01 NOT USED.

PARTIE 3 - EXECUTION

3.01 INSTALLATION AND CONNECTION OF FIXTURES AND ACCESSORIES

A. Location

1. Location of equipment, ducts and miscellaneous fixtures shown or described on plans is approximate.
2. Before installing any fixture, equipment, ductwork or accessory, verify exact location and ensure that existing installations do not interfere in any way.
3. In the event of discrepancy between plans from different professionals (Architect, Engineer) with regard to equipment location, submit request for confirmation to relevant professionals regarding definitive location. If equipment is installed prior to obtaining the professionals' interpretation of the

plans and specifications, Contractor shall assume all costs to relocate equipment as required, in accordance with the professionals' instructions.

4. Install fixtures and ductwork to minimize obstruction and conserve as much floor space as possible, in accordance with the manufacturer's recommendations and the Owner's requirements for safety, access and maintenance.
5. Assume costs for deviations required in conduit and accessories to avoid interference with structures of different trades.
6. At the Engineer's request, submit layout plans showing proposed location of various services and equipment.
7. Inform Engineer of installation schedule and request approval for exact location assigned.
    a. Depending on Owner's comments at work site, final position of equipment may differ slightly from that shown on drawings. However, such modifications will be indicated prior to installation, and no extra cost may be invoiced for such.

B. Installation

1. Unless otherwise indicated, follow manufacturer's most recent written instructions for materials and equipment to be used, as well as installation methods.
    a. Notify Engineer in writing of any discrepancies between plans and specifications and manufacturer's instructions, so Engineer can determine which documents to use.
2. Provide metal fasteners and fittings with same texture, color and finish as support to which they are attached. Use corrosion-resistant fasteners, anchors and spacers to secure exterior and interior structures.
3. Securely fasten all equipment mounted on steel or concrete structures to building components with spring vibration isolators. Use anchor bolts or bead welds to ensure vibration inside or near the building will not cause equipment assembly to slip from its attachment points.
4. Align the equipment edges with building walls.
5. Ensure maintenance and disassembly can be done without having to move piping or duct junctions by using fittings, unions and flanges, ensuring structural building elements or other installations do not act as obstructions.
6. Check factory connections and tighten as necessary to ensure integrity of the installation.
7. Run equipment drain lines to drains.
8. Provide an easy way to lubricate equipment, including lifetime lubricated bearings. Run tubes to facilitate lubrication of hard-to-reach points or when there are multiple points on a single fixture.

3.02 PIPING INSTALLATION

A. General

1. Install all HVAC piping and equipment as high as possible to maximize ceiling height in each room. Pay close attention to condensate piping installation, which drains by gravity.
2. Install piping in straight lines, close and parallel to walls and ceilings. Adjust pipe slope to meet specifications. Use standard fittings and long radius elbows when pipe changes direction.
3. Lay groups of pipe parallel to each other; space to facilitate insulation, identification, maintenance and repair. Mount pipes using trapezoidal suspension clamps.

4. Install concealed ductwork as close to building structure as possible to minimize space required for furring; leave as much clearance as possible.
5. Where pipe sizes differ from equipment fitting sizes, install reducers on fittings. Use of reduction sleeves is prohibited.
6. Replace any damaged brass or copper pipe or tubing.
7. Ream ends of pipes before connecting.
8. Install copper tubing in manner that ensures it is not dented or flattened, or that it will contact dissimilar metals.
9. Use non-corrosive lubricant or Teflon tape to cover threads.
10. For pipes with fluted ends, cut the pipes squarely: contact surface shall be clean and free of any nicks or notches.
11. Install ball joints to connect riser pipes to main lines. Use sleeves to connect each floor outlet to riser pipes.
12. Install flanges or union fittings so that equipment can be removed without moving the pipe.
13. Clean ends of pipes or tubes and fitting cavities to be brazed or welded. Join pieces without wedging them.
14. Remove deposits and dirt from inside and outside, before and after assembly.

B. Expansion

1. Install all piping to ensure it can expand and contract freely without buckling or causing excessive strain on connections.

C. Rubber sleeves

1. Provide and install rubber sleeves wherever copper piping is in contact with ferrous material.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 SUMMARY

A. This section involves the following items:

1. Materials and requirements for identifying HVAC piping and equipment, the various identification methods and elements used, including installation and location of identification systems.

1.03 REFERENCES

A. CGSB: Canadian General Standards Board (CGSB)

1. CAN/CGSB-1.60-M89: Interior Alkyd Gloss Enamel
2. CAN/CGSB-24.3-92: Identification of Piping Systems

1.04 ACTION SUBMITTALS

A. Comply with requirements set out in Section 01 33 00 – *Submittal Procedures.*

B. Technical product data: for each type of product indicated.

C. Samples:

1. Samples to include nameplates, labels, tags and lists of proposed legends.

1.05 QUALITY ASSURANCE

A. Execute work to CAN/CGSB 24.3-92, unless otherwise indicated.

PARTIE 2 - PRODUCTS

2.01 MANUFACTURER NAMEPLATES

A. Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

B. Lettering and numbers raised or engraved.

C. Information on nameplates to include, as appropriate:

1. Equipment: manufacturer’s name, model, size, serial number, power and flow rate.

2.02 MECHANICAL EQUIPMENT AND SYSTEM NAMEPLATES

A. Colours

1. Other materials: black letters on white background (unless otherwise indicated in relevant codes)

B. Material and other manufacturing characteristics

1. Laminated plastic or white anodized aluminium, 3 mm thick, matte finish, square corners, letters precisely aligned and centred, and machine-engraved into core.
2. Plates affixed to equipment with cable, chain or other approved corrosion resistant material.

C. Sizes:

1. Conform to following table:

Size no.	Dimensions (mm x mm)	Number of lines	Letter height (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

1. Use maximum of 25 letters/numbers per line.
2. Size according to location:
   a. Generally, size 5 plates.
   b. Size 6 plates for terminal units and control boards.
   c. Size 9 plates for equipment located in mechanical rooms.
   d. Other sizes as specified in other specification sections.

2.03 IDENTIFICATION OF PIPING SYSTEMS

A. Identification

1. Identify fluid flowing through piping with lettered legend, primary and secondary classification colors and pictograms (if necessary), and indicate direction fluid flows using arrows.

B. Legends

1. Uppercase lettering with height as stipulated in following table:

Outside diameter of pipe or covering	Letter height (mm)
20 to 32 mm	13 mm

Outside diameter of pipe or covering	Letter height (mm)
40 to 50 mm	20 mm
65 to 150 mm	32 mm
200 to 250 mm	65 mm
More than 250 mm	90 mm

2. Primary colour strips:
    a. On faucets/valves and fittings: 500 mm long.
    b. In other locations: 1000 mm long.
3. Secondary colour strips: 50 mm wide, applied 75 mm from one end of primary colour strip.

C. Arrows showing direction of flow
1. When outside diameter of pipe or covering is less than 75 mm: 100 mm long x 50 mm high.
2. When outside diameter of pipe or covering is 75 mm or more: 150 mm long x 50 mm high.
3. Use double-headed arrows where flow is reversible.

D. Materials
1. Manufacturers: subject to compliance with specifications, provide products from any of following manufacturers:
    a. Brady Corporation
    b. Brimar Industries, Inc.
    c. Carlton Industries, LP
    d. Champion America
    e. Craftmark Pipe Markers
    f. Emedco
    g. Kolbi Pipe Marker Co
    h. LEM Products Inc.
    i. Marking Services Inc.
    j. Seton Identification Products
2. Materials for background colour marking, legend, arrows
    a. Pipes and tubing 20 mm and smaller: water-repellant, heat-resistant, self-adhesive plastic labels.
    b. Other pipes: water-repellant, plastic-coated cloth with protective overcoating, waterproof contact adhesive undercoating, suitable for 100% ambient RH, continuous operating temperature of 150 °C and intermittent temperature of 200 °C.
    c. Wrap labels around pipe, overlapping ends by a length equivalent to pipe diameter.

E. Legend and colours

1. Piping and faucet identification

Piping reference legend	Faucet label legend	Primary colour	Secondary colour	Color of pipe when painted
Suction – refrigerant	SUCTION – REFRIGERANT	Yellow	None	–
Liquid – refrigerant	LIQUID – REFRIGERANT	Yellow	None	–

2. Legends and arrows

a. Black or white, contrasting with primary colour.

PARTIE 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 TIMING

A. Identify systems and fixtures only once all painting is completed in the building.

3.03 INSTALLATION

A. Identify all added or renovated structures including systems with new thermal insulation or finishes.

B. Perform work in accordance with CAN/CGSB-24.3, unless otherwise indicated.

3.04 MANUFACTURER NAMEPLATES

A. They must be easy to read. They shall not be painted or covered with thermal insulation.

3.05 EQUIPMENT AND SYSTEM NAMEPLATES

A. Locations

1. Plates to clearly identify piping fixtures and systems; affix where they can easily be seen and legible from work floor.
2. On heated or insulated surfaces, install spacers beneath nameplates.

B. Protection

1. Application of paint or any other finish on identification plates is prohibited.

3.06 LOCATION OF IDENTIFICATION ON PIPING SYSTEMS

A. On long straight runs in open areas in equipment rooms and crawl spaces: at not more than 17-m intervals and more frequently as needed to ensure at least one is visible from any one viewpoint in operating areas and walking aisles.

B. Adjacent to each change in direction.

C. At least once in each small room through which piping or ductwork passes.

D. On both sides of visual obstruction or where run is difficult to follow.

E. On both sides of separations such as walls, floors, partitions.

F. Where system is concealed in pipe chase, ceiling space, crawl space or other confined space: at entry and exit points, and at access openings.

G. At beginning and end points of each run and at each piece of equipment in run.

H. At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

I. Identification easily and accurately readable from usual operating areas and from access points.

1. Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.07 LOCATION OF IDENTIFICATION ON VALVES

A. Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed “S” hooks.

B. Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Owner. Provide one copy (reduced in size if required) in each operating and maintenance manual.

C. Number valves in each system consecutively.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 REFERENCES

A. ANSI/ASME B16.22-2001, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

B. ANSI/ASME B16.24-2001, Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900 1500 and 2500.

C. ANSI/ASME B16.26-1998, Cast Copper Alloy Fittings for Flared Copper Tubes.

D. ANSI/ASME B31.5-2001, Refrigeration Piping and Heat Transfer Components.

E. ASTM A 307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

F. ASTM B 280-03, Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

G. CSA B52-05, Mechanical Refrigeration Code.

H. CEPA 1/RA/1, Environmental code of practice for the elimination of fluorocarbon emissions from refrigeration and air conditioning systems.

1.03 ACTION SUBMITTALS

A. Comply with requirements set out in Section 01 33 00 – *Submittal Procedures.*

B. Technical product data: for each type of product indicated.

PARTIE 2 - PRODUCTS

2.01 TUBING

A. Processed for refrigeration installations, deoxidized, dehydrated and sealed.

1. Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ANSI/ASME B31.5.

2.02 FITTINGS

A. Operating conditions: pressure and temperature ratings of 2070 kPa and 121 ºC respectively.

B. Brazed fittings

1. Fittings: wrought copper to ANSI/ASME B16.22.
2. Joints: silver, 45% Ag-15% Cu or copper-phosphorus, 95% Cu-5%P, with non-corrosive flux.

C. Flared fittings

1. Fittings: bronze or brass, for refrigeration, to ANSI/ASME B16.26.

2.03 PIPE SLEEVES

A. Hard copper or steel, sized to provide 6 mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.

2.04 VALVES

A. 22 mm and under: class 500, 3.5 Mpa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.

B. Over 22 mm: class 375, 2.5 Mpa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moisture proof seal for below freezing applications, brazed connections.

PARTIE 3 - EXECUTION

3.01 GENERAL

A. Install piping in accordance with CSA B52, ANSI/ASME B31.5 and document 1/RA/1 published by CEPA.

B. Connect piping to equipment with union fittings and supply isolation valves.

C. Provide adequate clearance for maintenance, dismantling and removal of fixtures and components; follow manufacturer's recommendations.

D. Seal unconnected ends of piping and any other openings to prevent entry of foreign matter.

3.02 BRAZING PROCEDURES

A. Bleed inert gas into pipe during brazing.

B. Remove valve internal parts, solenoid valve coils, sight glass.

C. Do not apply heat near expansion valve and bulb.

3.03 PIPING INSTALLATION

A. General

1. Hard drawn copper tubing: do not bend. Minimize use of fittings. Soft annealed copper tubing: bend without crimping or constriction.

2. Hot gas lines:
   a. Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

3.04 LEAK TESTS

A. Close valves on factory-charged equipment and other equipment not requiring leak testing.

B. Leak test to CSA B52 before evacuation to 2 MPa and 1 MPa on high and low sides respectively.

C. Test procedure: build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.05 DEHYDRATION AND CHARGING

A. Close service valves on factory charged equipment.

B. Ambient temperatures to be at least 13 ºC for at least twelve (12) hours before and during dehydration.

C. Use copper lines of largest practical size to reduce evacuation time.

D. Use two-stage vacuum pump with gas ballast on second stage capable of pulling 5 Pa absolute and filled with dehydrated oil.

E. Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.

F. Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:
   1. Twice to 14 Pa absolute and hold for four (4) hours.
   2. Break vacuum with refrigerant and raise to 14 kPa.
   3. Final to 5 Pa absolute and hold for at least 12 hours.
   4. Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
   5. Submit test results to Engineer.

G. Load
   1. Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
   2. With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
   3. Re-purge charging line if refrigerant container is changed during charging process.

H. Controls
   1. Make checks and measurements as per manufacturer’s operation and maintenance instructions.

2. Record measurements taken and submit to Engineer.

3.06 INSTRUCTIONS

A. Display instructions in a frame, under glass, in accordance with the requirements of CSA B52.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 REFERENCES

A. Air-Conditioning, Heating & Refrigeration Institute (AHRI)

1. ANSI/CAN/AHRI 1230-2014 Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment.

B. ASHRAE: American Society of Heating and Air-Conditioning Engineers.

1. ANSI/ASHRAE 15-2019 Safety Standard for Refrigeration Systems
2. ANSI/ASHRAE 34-2019 Designation and Safety Classification of Refrigerants
3. ANSI/ASHRAE 135-2016, BACnet – A Data Communication Protocol for Building Automation and Control Networks

C. ASME: American Society of Mechanical Engineers.

1. ASME Boiler and Pressure Vessel Code, 2017 Edition.

D. NFPA: National Fire Protection Association

1. NFPA 90A-2018: Standard for the Installation of Air-Conditioning and Ventilating Systems.
2. NFPA 90B-2018: Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

E. Québec

1. CCQ1: Québec Construction Code – Chapter I – Building, and National Building Code of Canada 2010 (amended)
2. CCQ5: Québec Construction Code – Chapter V – Electricity – Canadian Electrical Code, Part I with Québec Amendments, 2010.

1.03 ACTION SUBMITTALS

A. Technical product data: for each type of product.

1. Include description of materials, dimensions of individual components and assemblies, and finishes for computer room air conditioners.
2. Include power ratings, operating characteristics, electrical characteristics, and special equipment and accessories provided.

B. Shop drawings: for computer room air conditioners.

1. Include plans, elevations, sections, and details of anchor attachments.

2. Include equipment assembly details. Specify dimensions, weights, loads, required clearances, method of field assembly, components, as well as location and size of each field connection.
3. Include diagrams for power, signal and control wiring.

1.04 INFORMATION SUBMITTALS

A. Coordination drawings: plan and elevation views, along with other details, drawn to scale, from data provided by installers of relevant components.

B. In addition to equipment specifications, shop drawings shall include equipment connection diagrams that demonstrate that refrigeration piping lengths between individual units have been considered in equipment sizing.

C. Reports for quality control performed on-site.

1.05 CLOSEOUT SUBMITTALS: DOCUMENTATION

A. Provide required operating and maintenance cards.

1.06 WARRANTY

A. Special warranty: manufacturer undertakes to repair or replace, by providing parts and labour, any defective air conditioner components during specified guarantee period.
1. Warranty period for compressors: manufacturer's standard, but not less than ten (10) years from Date of Substantial Completion.

PARTIE 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: subject to compliance with specifications, provide products from any of following manufacturers:
1. Daikin
2. Mitsubishi
3. LG

2.02 GENERAL

A. Air-cooled heat pump type variable refrigerant flow air conditioning / heating systems capable of modulating evaporating temperature according to load, thereby generating energy savings by reducing pressure differential at compressors.

B. Systems with AHRI 1230-certified performance ratings.

C. Designed to meet configurations shown on plans, which include installation distances, outside air supply principle, connection ratio, number of evaporators connected to each compressor/condenser unit, refrigerant charge and component location.

D. Heat recovery type systems shall be designed so that heating and cooling unit heat exchange can take place between all units connected to same compressor/condenser unit, not only between units connected to same branch selector box.

E. Test all indoor units according to CSA C22.2 No.236.

2.03 COMPRESSOR/CONDENSER UNIT

A. General

1. Entire compressor/condenser units, pre-wired with all necessary refrigeration controls, designed for modular installation, side-by-side.
2. To prevent revaporization when indoor units are supplied, units must have subcooling capacity.
3. The unit refrigeration circuit shall include variable displacement scroll compressors, motors, fans, condensing coil, electronic expansion valves, solenoid valves, 4-way valve, manifolds, capillaries, filters, manual isolation valves, oil separators, service ports, liquid receiver and vacuum tank.
4. Units equipped with the following safety equipment: high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heater, fuse cap, overload relay, inverter overload protection, thermal protection for compressors and fans, inverter overcurrent protection and anti-cycling timer.
5. Weatherproof and corrosion-resistant cabinet constructed of corrosion-resistant galvanized steel panels covered with a baked enamel finish.
6. Units equipped with one or more direct drive axial fans protected by guards and variable speed motors with permanently lubricated bearings.
7. Condenser coil (air-cooled units)
    a. Coil shall have corrugated copper tubes with corrugated aluminium fins.
    b. Coat fins with anti-corrosive coating with 1000-hour salt spray resistance, to ASTM B117.
8. Compressors
    a. Units shall be equipped with variable speed scroll compressors capable of modulating speed to follow variations in cooling and heating loads measured at suction pressure in compressor/condenser units.
    b. Pressure measurement and velocity correction shall be frequent enough (every twenty (20) seconds), to prevent significant deviation from target values.

c. Compressor motor shall have a cooling system that prevents sudden temperature changes, thereby eliminating stress on winding and bearings.

d. Ensure units have oil separators and an intelligent oil management system.

e. Compressors should be installed on elastomeric bearings to minimize vibration.

f. If a compressor fails, remaining compressors shall be able to provide required heating or cooling at proportionately reduced capacity. The microprocessor and its controls shall be manually activated to address this condition for single or manifold systems.

9. Noise control

a. Units shall have a control sequence to reduce fan noise at night, featuring two (2) sound pressure reduction levels of 5 dBA and 10 dBA.

b. In air conditioning mode, units shall be able to adjust refrigerant evaporating temperature in three (3) stages, to reduce system energy consumption.

c. If multiple compressor/condenser units are installed together on same refrigerant system, if a unit fails, other units shall be able to continue operating to provide remaining cooling or heating capacity to indoor units.

2.04 INDOOR WALL FAN COIL UNITS

A. General

1. Indoor wall fan coil units with direct expansion coil, factory assembled and tested, operating with R410A refrigerant.
2. Units pre-charged in factory with dehydrated air.
3. Units equipped with electronic expansion valve that uses a PID control loop to automatically adjust flow of refrigerant through unit.
4. Units equipped with diagnostic and auto restart functions, three-minute time-delay fuse and test mode switch.
5. Units equipped with automatic pivoting damper that ensures efficient air distribution and closes automatically when unit stops. Ensure unit can be adjusted to five separate discharge angles with remote control. Ensure front grill is easily removable for washing. Discharge angle at restart should default to same angle as last time unit was on.

B. Cabinet

1. Ensure cabinet is attached to wall mounting plate provided with unit and installed in air-conditioned space.
2. Inside of cabinet shall be soundproofed with polystyrene and polyethylene foam.
3. Ensure unit is equipped with a return air thermistor.

C. Motor with direct coupling, two-speed selector (high and low) and thermal protection.

D. Fan shall be cross-flow. Ensure static and dynamic balancing to minimize vibration.

E. Condenser coil

1. Direct expansion, corrugated copper tubing with mechanically corrugated aluminum fins, two rows, 14 fins per 25 mm (14 fins/in.). Ensure they are factory tested.

2. Coil fittings shall be flared.
3. Thermistors on liquid and gas piping shall be factory installed.

F. Ensure units have condensate drain pans under coils. Outlet connection: PVC with outer diameter of 17 mm (11/16 in.). Unit drain pipe shall be able to be connected on left or right side of unit.

2.05 REFRIGERATION PIPING JOINTS

A. Use special joints to generate equivalent of a “Tee” at refrigeration piping connection to achieve rated performance of variable refrigerant flow system. Use joints from system manufacturer.

B. Acceptable product: REFNET or equivalent.

2.06 CONTROLS

A. Network

1. Variable refrigerant flow system shall have its own control network between each compressor/condenser unit and evaporator units connected to it. Daisy chain evaporator units together.
2. Control communication network wire: two-conductor, 16/18 AWG, unshielded multi-strand wire.

B. Main control elements on indoor units: local controllers, such as Daikin BRC7E818 or equivalent. Variable refrigerant flow system shall be fully autonomously controlled.

PARTIE 3 - EXECUTION

3.01 INSTALLATION

A. Install air conditioners level and plumb, complying with manufacturer-recommended clearances.

B. Air-cooled refrigerant condenser assembly Install structural base using insulators anchored to building structure.

C. Install according to approved shop drawings and manufacturer’s recommendations to ensure system integrity. Send any drawings changes in writing to system manufacturer to validate feasibility, revalidate refrigerant charge and, if changes are accepted, update system to reflect adjustments.

D. Confirm final layout of all units to establish final required lengths for refrigerant lines as well as final load.

E. Install piping at compressor/condenser unit outlets to reduce mechanical stress due unit vibration. To accomplish this, refrigerant piping shall make two (2) 90° changes in direction (with elbows) at unit outlet. Second elbow shall be followed by length of straight piping before first clamp that is long enough to absorb vibration. Flexible hose may be used if above-mentioned method cannot be implemented. This installation shall be performed according to manufacturer recommendations and under manufacturer supervision.

F. Drain each evaporation unit.

G. Install shut-off ball valves on each refrigeration pipe upstream from each branch selection box.

H. Isolate liquid and suction lines individually between outdoor unit and each indoor unit.

I. Coordinate controls with manufacturer.

J. Provide all necessary accessories to ensure variable refrigerant flow systems are fully operational and functional.

K. Ensure oil and refrigerant charges are adequate.

3.02 ON-SITE QUALITY CONTROL

A. Perform following tests and inspections with assistance from authorized manufacturer service representative:

1. Inspect for and remove shipping bolts, blocks and tie-down straps.
2. Once air conditioners in computer room are installed and electrical circuits are powered, check for compliance with requirements.
3. Operational tests: After powering electrical circuits, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safety devices. Replace damaged or defective controls and equipment.

B. Air conditioners will be considered defective if they do not pass testing and inspection.

C. Prepare test and inspection reports.

D. A manufacturer's representative shall train Owner's service personnel on how to adjust, operate and maintain variable refrigerant flow systems.

1. Training time: two (2) hours.

3.03 SETTINGS

A. Adjust initial temperature setpoints and occupancy schedules.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 REFERENCES

A. CSA

1. CAN3-C235-83 (R2015): Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

B. Québec

1. CCQ: Québec Construction Code – Chapter I – Building, and National Building Code of Canada 2010 (amended)
2. CCQ5: CSA C22.10-18: Québec Construction Code, Chapter V – Electricity. Canadian Electrical Code with Québec Amendments

1.03 FEES, PERMITS AND INSPECTION

A. Coordinate with utility providers for connection of electrical and telecommunications services. Provide electrical installation inspection service and power supplier with as many copies of shop drawings and specification sections they require for assessment and approval prior to start of Work.

B. Inform Engineer of modifications required by *Régie du bâtiment du Québec* or by other utility supplier, before proceeding with an installation that differs from plans and specifications.

C. Upon completion of Work, obtain acceptance certificate from electrical installation inspection service and transmit to Engineer.

1.04 WORK COORDINATION

A. Coordinate electrical work with that of other Divisions.

B. Where equipment interferes, no extra compensation will be paid to Contractor to modify installations or equipment position resulting from lack of worksite coordination.

C. Obtain Owner's written authorization for precise and final position of equipment and accessories in different building rooms.

1.05 RATED VOLTAGE

A. Operating voltages: to CAN3-C235.

B. Ensure all electrical equipment (motors, heating units, control and distribution devices, etc.) operates satisfactorily at 60 Hz and within limits established in aforementioned standard.

1.06 MANUFACTURER AND CERTIFICATION LABELS

A. Install electrical equipment so manufacturer and certification agency nameplates are visible and legible.

1.07 LIVE EQUIPMENT

A. Ensure personnel and property safety, and protect equipment that is live and exposed during construction, to CCQ5 requirements.

B. Lock or keep closed and identify rooms that are live with the warning “Circuit sous tension 120 Volts” (120-V live circuit), or appropriate voltage if different.

C. Ensure rooms containing electrical distribution equipment are properly closed or fitted with adequate temporary doors. Keep these doors locked and prominently display a warning sign that prohibits unauthorized personnel from entering.

1.08 INSTALLATION AND CONNECTION OF FIXTURES AND ACCESSORIES

A. Location

1. Location of equipment, ducts and miscellaneous fixtures shown or described on plans is approximate.
2. Before installing any fixture, equipment, ductwork or accessory, verify exact location and ensure that existing installations do not interfere in any way.
3. In the event of discrepancy between plans from different professionals (Architect, Engineer) with regard to equipment location, submit request for confirmation to relevant professionals regarding definitive location. If equipment is installed prior to obtaining the professionals’ interpretation of the plans and specifications, Contractor shall assume all costs to relocate equipment as required, in accordance with the professionals’ instructions.
4. Install fixtures and ductwork to minimize obstruction and conserve as much floor space as possible, in accordance with the manufacturer’s recommendations and the Owner’s requirements for safety, access and maintenance.
5. Assume costs for deviations required in conduit and accessories to avoid interference with structures of different trades.
6. At the Engineer’s request, submit layout plans showing proposed location of various services and equipment.
7. Inform Engineer of installation schedule and request approval for exact location assigned.
    a. Depending on Owner’s comments at work site, final position of equipment may differ slightly from that shown on drawings. However, such modifications will be indicated prior to installation, and no extra cost may be invoiced for such.

B. Installation

1. Unless otherwise indicated, follow manufacturer’s most recent written instructions for materials and equipment to be used, as well as installation methods.
    a. Notify Engineer in writing of any discrepancies between plans and specifications and manufacturer’s instructions, so Engineer can determine which documents to use.
2. Ensure that floors and slabs where equipment will be installed are level.

3. Provide metal fasteners and fittings with same texture, color and finish as support to which they are attached. Use corrosion-resistant fasteners, anchors and spacers to secure exterior and interior structures.
4. Securely fasten all equipment mounted on a steel or concrete structure to building components with spring vibration isolators or beams. Use anchor bolts or bead welds to ensure vibration inside or near the building will not cause equipment assembly to slip from its attachment points.
5. Align the equipment edges with building walls.

1.09 LOCATION OF OUTLETS AND RECEPTACLES

A. Install all outlets and receptacles in accordance with requirements.

B. Install outlets and receptacles in walls with minimum horizontal clearance of 150 mm (6 in.) between boxes, ensuring they are never installed back-to-back.

C. Location of outlets and receptacles may be modified at no extra cost or credit, providing distance does not exceed 3000 mm (9.84 ft) and information is given prior to installation.

D. Install light switches on latch side of doors. Locate isolating switches in mechanical and elevator machine rooms on latch side of floor.

1.10 MOUNTING HEIGHT

A. If mounting height of equipment is not specified or indicated, verify with authorized personnel before proceeding with installation.

B. Unless otherwise indicated, install electrical equipment at following heights: Equipment mounting height, from finished floor to centerline of equipment item:

1. Light switches: 1200 mm
2. Wall receptacles:
   a. General: 400 mm
   b. Above top of continuous baseboard heater: 200 mm.
   c. Receptacles above countertops or backsplash: 175 mm.
   d. In mechanical rooms: 1400 mm.
3. Distribution panel: to CCQ5.

1.11 MOTOR AND CONTROL CONNECTION

A. Connect all motors and proceed with start-up in collaboration with equipment installer.

B. Prior to starting up the motors for the first time, check the following:

1. Motor rotation direction is appropriate for the mechanical equipment.
2. Over-loading and over-current protection is adequate.
3. All control stations and selector switches:

4. The voltage and amperage at each motor terminal.
5. Voltage available at each starter terminal.

C. Provide Engineer with “Motor Testing” chart showing tests performed and various voltage and amperage readings measured.

D. As needed or at Engineer’s request, ensure manufacturer representative is present when motors and motor starters are started up.

1.12 TESTING

A. Test the following systems:
1. Tests required by the codes and standards in force
2. Circuits originating from branch distribution panels

B. Test wires and cables in accordance with CSA C22.2 No. 0.3.

C. Provide manufacturer’s certificate or written statement certifying that the installation of each system was performed to its entire satisfaction, as prescribed and in accordance with plans and specifications.

D. High potential (Hipot) testing
1. Measure dielectric strength of branches, feeders and equipment rated at 350 V maximum using a 500 V megger meter.
2. Measure dielectric strength of branches, feeders and equipment rated between 350 and 600 V using a 1000 V megger meter.
3. Check resistance to ground before powering.

E. Perform testing with Engineer in attendance.

F. Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

G. Test following systems:
1. Electrical power generation and distribution system including phasing, voltage, grounding and load balancing
2. Circuits originating from branch distribution panels
3. Lighting system and lighting control
4. Motors, heaters and associated control equipment, including sequenced operation, where applicable
5. Load controller

H. Submit test results to Engineer.

1.13 CONCEALED STRUCTURES

A. Unless otherwise indicated, conceal pipes, ducts and wiring in walls and ceilings of finished areas.

B. Prior to closing walls, floors and ceilings concealing pipes, ducts and wiring, notify Engineer so required inspections can be performed.

1. When this requirement is not met, and at the Engineer's request, uncover work for inspection and patch without compensation.

1.14 FINISHING

A. Shop finish metal cladding surfaces. Coat inside and outside with rustproof primer and at least two coats of enamel paint finish.

1.15 ACCESS DOORS IN ARCHITECTURAL ELEMENTS

A. Supply required access doors to all concealed equipment and accessories that require maintenance, repair or adjustment.

B. Choose model according to purpose and type of material in which doors are installed.

1.16 TEMPORARY UTILITIES

A. Electrical contractor will provide, install and maintain a complete temporary lighting and power system for construction purposes. Unless otherwise indicated, this system shall remain property of applicable contractor at end of contract and such contractor will be responsible for dismantling and removing system from site upon completion of construction. System will include: 600-volt, 3-phase, 3-wire power supply, as well as a 120/240- and/or 120/208-volt, 3-phase, 4-wire power supply.

B. System will include supply and installation of electrical service, wiring, etc., required to power all trades. Electrical contractor will be responsible for replacing bulbs if they break, are found to be defective or stolen.

C. Electrical contractor will use existing system to feed its temporary lighting and power system.

D. If 600-volt power is required, construction for testing and operation of certain equipment (that are part of the building), and temporary 600 volt power is not powered at that time, electrical contractor will be responsible for supplying said voltage. This clause does not cover site equipment that must operate at 600 volts.

E. Lighting fixtures shall provide minimum illumination level of 150 lux measured at floors and stairs, and 20 lux outside building.

F. Electrical contractor shall take care to follow all recent guidelines regarding safety standards to be applied on work sites.

1.17 DEMOLITION

A. Where indicated on plans, remove unneeded materials, equipment, pipes, ducts and accessories, and cap off as required and indicated.

B. Removed materials that are not reused shall be removed from the building daily.

C. Equipment and accessories that were removed and will not be reused shall be offered to Owner, who shall decide whether or not they will be kept. If Owner does not want to keep them, they become the property of the involved Contractor, who must remove them from the site and dispose of them at its discretion, at no additional cost.

D. Remove all existing conductors, pipes, conduit and cables up to source, main conduit, or up to last junction box to remain operation, and cap off openings created in units with appropriate fixtures.

E. General Contractor is responsible for demolishing suspended ceilings to perform work and to replace any broken ceiling tiles.

F. Ensure that all electrical equipment preserved is powered. If equipment inside or outside work zone is no longer powered due to removal of other equipment, electrical contractor shall reconnect it.

G. All systems removed or modified shall be done in manner that does not interfere with operation of existing facilities.

1.18 EXISTING EQUIPMENT TO RE-LOCATE

A. Re-locate all equipment as indicated on plans and/or described in specifications and supply, install and connect all accessories required to this end.

B. Remove and temporarily store (where applicable) all existing equipment to be re-located, ensuring that it will not be damaged or stolen. In the event that any of the said equipment is damaged or disappears during the course of the work, any inherent costs for replacing it with identical equipment shall be assumed by the person responsible for re-locating the said equipment.

C. Every person is responsible for notifying the Engineer of any existing equipment to re-locate that is broken or defective before it is dismantled.

D. Engineer considers all existing equipment to be re-located as clean and in good operating condition. Any notice of equipment defect or poor condition submitted to Engineer after said equipment has been removed shall be rejected, and Engineer will consider defects or poor condition to be attributable to equipment mishandling. Any inherent costs for replacing equipment shall be submitted to Contractors.

PARTIE 2 - PRODUCTS

2.01 NOT USED.

PARTIE 3 - EXECUTION

3.01 NOT USED.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 REFERENCES

A. CSA

1. CSA C22.2 No. 0.3-09 (R2019): Test Methods for Electrical Wires and Cables.
2. CSA-C22.2 No. 18.3-12 (R2017): Conduit, Tubing, and Cable Fittings (Tri-National Standard, with ANCE NMX-J-017 and UL 514B).
3. CSA-C22.2 No. 65-18: Wire Connectors (Tri-National Standard with NMX-J-543-ANCE and UL 486A-486B).
4. C22.2 No. 123-16: Metal Sheathed Cables.
5. CSA C22.2 No. 131-17: Type TECK 90 Cable.
6. CSA C22.2 No. 174-18: Cables and Cable Glands for Use in Hazardous Locations.
7. CSA C22.2 No. 65-13: Wire Connectors (Tri-National Standard, with UL 486A-486B and NMX-J-543-ANCE).

B. Electrical and Electronic Manufacturers Association of Canada (EEMAC)

1. EEMAC Standard 1Y-2, 1961: Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

C. National Electrical Manufacturers Association (NEMA)

1.03 ACTION SUBMITTALS

A. Comply with requirements set out in section 01 33 00 – *Submittal Procedures.*

B. Technical product data: for each type of product indicated.

PARTIE 2 - PRODUCTS

2.01 BUILDING WIRING

A. Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

B. Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, jacketed. Unless otherwise indicated, all conductors are copper.

C. Aluminium conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, non-jacketed.

2.02 TECK 90 CABLE

A. Conductors
   1. Grounding conductor: copper or aluminium as indicated.
   2. Supply conductors: copper or aluminum as indicated, size as indicated.

B. Insulation
   1. Cross-linked polyethylene (XLPE).
   2. Nominal volts: 600 V.

C. Inner jacket: polyvinyl chloride material.

D. Armour: interlocking aluminum.

E. Outer shell: Thermoplastic polyvinyl chloride, Fire Retardant (FT-4) type.

F. Fasteners
   1. One-hole stainless steel clamps to secure surface cables 50 mm (2”) or smaller. Two-hole steel straps for cables larger than 50 mm (2”).
   2. U-channels for groups of two or more cables, installed at 915 mm (36”) on-centre.
   3. Threaded suspension rods: 6 mm (1/4”) diameter, for U-channels.

G. Cable connectors: with waterproof packing box, grounding bushing, stop nut assembly and sealing ring.

H. Special connections in zone 0, 1 or 2 locations: according to classification of zone where they are installed.

2.03 ARMOURED CABLES

A. Conductors: insulated, copper, size as indicated.

B. Type AC90.

C. Armour: interlocking aluminum.

D. Type ACWU90, with flame retardant PVC jacket covering thermoplastic armor.

E. Connectors: appropriate for type of cable.

2.04 CONNECTORS AND SPLICES

A. Pressure-type wire connectors: to CAN/CSA-C22.2 No. 65, with current carrying parts suitable for and sized to fit copper or aluminium conductors as required.

B. Clamps or connectors for armored cable and TECK cable, as required.

PARTIE 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

B. Immediately notify Engineer of any unacceptable conditions found.

C. Proceed with installation only after unacceptable conditions have been remedied.

3.02 GENERAL CABLE INSTALLATION

A. Use a colour code for the cables that conforms to Section 26 05 53 – *Identification for Electrical Systems*.

B. Conductor length for parallel feeders to be identical.

C. Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

D. Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

E. Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be two-wire circuits only, i.e. common neutrals not permitted. Provide numbered wire collars for control wiring.

3.03 INSTALLATION OF BUILDING WIRES

A. Install wiring as follows:

1. In conduit systems, to Section 26 05 33.06 – *Conduits, Conduit Fastenings and Conduit Fittings.*

3.04 INSTALLATION OF TECK 90 CABLES

A. Unless otherwise indicated, leave required space between cables to maintain allowable conductor capacity.

B. Horizontal runs: secure cables with approved cable ties every 1500 mm (60”). Vertical runs: secure cables with approved cable ties every 900 mm (36”).

C. Install cable in cable trays or U-channels.

D. Install exposed cable securely supported by straps.

3.05 INSTALLATION OF ARMOURED CABLES

A. As much as possible, group cables into U-channels.

B. Armored cables are permitted only for following applications and conditions:

1. Final connection of lighting fixtures if cable length does not exceed 1500 mm (5'). Connections from one lighting fixture to another are not permitted.
2. In ceilings and drywall, between lighting fixtures if cable length between two lighting fixtures or between junction box and lighting fixture does not exceed 3000 mm (10').
3. As indicated on plans.

C. Horizontal cable runs in walls are not acceptable.

D. Installation of AC-90 armored cable exposed on surface is prohibited.

3.06 ON-SITE QUALITY CONTROL

A. Test in accordance with the requirements of Section 26 05 00 – *Common Requirements for Electrical Work*.

B. Perform tests using methods appropriate to site conditions and to approval of Engineer and local authority having jurisdiction over installation.

C. Perform tests before energizing electrical system.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 SUMMARY

A. This section involves following items:

1. Fasteners and supports for electrical equipment and systems
2. Construction requirements for blinding slabs.

B. Related requirements:

1. Section 26 05 48 – *Anti-Vibration and Seismic Systems and Devices for Electrical Systems* for products and installation requirements necessary for seismic compliance.

1.03 ACTION SUBMITTALS

A. Comply with requirements set out in section 01 33 00 – *Submittal Procedures.*

B. Technical product data: for each type of product indicated.

PARTIE 2 - PRODUCTS

2.01 U-CHANNELS

A. Reference product: subject to compliance with specifications, provide Thomas & Betts, Superstrut or comparable product from one of following manufacturers:

1. Cooper B-Line
2. Flex-Strut
3. G-Strut
4. Powerstrut
5. Unistrut

B. U-channels: 41 x 41 mm (1-5/8" x 1-5/8"), 2.6 mm (1/10") thick, galvanized steel, surface-mounted or suspended, complete with accessories and hardware.

PARTIE 3 - EXECUTION

3.01 INSTALLATION

A. Secure equipment to hollow or solid masonry, tile and plaster surfaces with lead anchors or nylon sockets.

B. Secure equipment to poured concrete surfaces with expandable inserts.

C. Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

D. Secure surface-mounted equipment to inverted T-bar ceilings with twist clip fasteners. Before installing, ensure that T-bars are adequately supported to carry weight of equipment.

E. Support equipment, conduit or cables using clips, spring-loaded bolts, and cable clamps designed as accessories to basic U-channel members.

F. Fasten exposed conduit or cables to building construction or support system using:

1. One-hole steel straps to secure surface conduit and cables with a diameter of 53 mm (2”) or less.
2. Two-hole steel straps for conduit and cables with a diameter of more than 53 mm (2”).
3. Clamps to secure conduit to exposed steel work.

G. Suspended support systems:

1. Support individual cable or conduit runs with 10 mm (3/8”) diameter threaded rods and spring clips.
2. Support two (2) or more cables or conduit in U-channels suspended with 10 mm (3/8”) diameter threaded hanger rods where direct fastening to building construction is impractical.

H. For surface mounting of two or more conduits use U-channels at 1500 mm (60”) on-centre spacing.

I. Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

J. Use wire lashing or perforated strap to support or secure raceways or cables.

K. Supports or equipment installed for other trades may not be used for conduit or cable support except with permission of other trade and approval of Engineer.

L. Install fasteners and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer’s installation recommendations.

M. Drilling holes in or welding structure to fasten conduit supports, casings or equipment is prohibited. Use only hardware and accessories designed for U-channels.

N. Coat all scratched or altered surfaces and cuts in galvanized items with galvanization product.

3.02 BLINDING SLABS

A. Unless otherwise specified on plans, place all equipment on a 150 mm (6”) blinding slab with beveled ends and extending a minimum of 150 mm (6”) around equipment to facilitate cleaning.

B. Blinding slabs to be designed by structural engineer and poured under their supervision. Blinding slabs shall be reinforced, securely anchored to building structure and designed to allow for anchoring of equipment they support, taking into account seismic and wind loads.

C. Before installing equipment, paint blinding slabs black or other approved colour that contrasts sharply with floor.

TABLE OF CONTENTS

PARTIE 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions of the Contract are applicable to this section, including General Clauses and Technical Clauses, as well as the specifications sections of Division 01.

1.02 REFERENCES

A. CSA

1. CSA C22.2 No. 45.1-07 (R2012): Electrical Rigid Metal Conduit – Steel (Tri-National standard, with UL 6 and NMX-J-534-ANCE-2007).
2. CSA C22.2 No. 56-13: Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
3. CSA C22.2 no 83.1-07 (R2012): Electrical Metallic Tubing – Steel (Tri-National Standard, with UL 797 and NMX-J-536-ANCE-2007).
4. CSA C22.2 No. 211.2-06 (R2011): Rigid PVC (Unplasticized) Conduit.

1.03 ACTION SUBMITTALS

A. Comply with requirements set out in section 01 33 00 – *Submittal Procedures.*

B. Technical product data: for each type of product indicated.

PARTIE 2 - PRODUCTS

2.01 CONDUIT

A. Rigid galvanized steel conduit, threaded to CSA C22.2 No. 45.

B. Epoxy coated conduit: with zinc coating and corrosion resistant epoxy finish inside and outside, to CSA C22.2 No. 45.

C. Electrical metallic tubing (EMT): with couplings, to CSA C22.2 No. 83.

2.02 CONDUIT FASTENERS

A. One-hole steel straps to secure surface conduits with nominal diameter of 53 mm (2”) or less. Two-hole steel straps for conduit with nominal diameter of more than 53 mm (2”).

B. Beam clamps to secure conduits to exposed steel work.

C. U-channel type supports for two or more conduits at 2.5 m (8’) on-centre.

D. Threaded rods, 5 mm (1/4”) diameter, to support suspended hangers.

2.03 CONDUIT FITTINGS

A. Fittings: specially manufactured for prescribed conduits. Coating: same as conduit.

B. Factory “ells” at 90-degree bends for conduit with diameter of 27 mm (1”) or larger.

C. Fittings and couplings for electrical metallic tubing: locking screw and compression, depending on location, as specified in Part 3.

2.04 EXPANSION FITTINGS FOR RIGID CONDUIT

A. Weatherproof expansion fittings ensuring grounding continuity, suitable for 100 mm (4”) linear expansion.

B. Weatherproof expansion fittings for linear expansion at entry to panel.

2.05 PULL ROPE

A. 5 mm (1/4”) stranded polypropylene, tensile strength5 kN (1124 lbf).

PARTIE 3 - EXECUTION

3.01 INSTALLATION

A. Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

B. Conceal conduits except in unfinished areas and mechanical and electrical service rooms.

C. Use rigid galvanized steel threaded conduit.

D. Use epoxy-coated conduit in corrosive areas.

E. Use EMT electrical metallic tubing, unless otherwise indicated.

F. Use rigid PVC conduit underground or in corrosive environments.

G. Use flexible metal conduit for work in movable metal partitions, connection to recessed incandescent lighting fixtures without prewired outlet box, and connection to surface or recessed fixtures.

H. Use liquid-tight flexible metal conduit for connection to motors or vibrating equipment.

I. Use explosion-proof flexible fittings for explosion-proof motor connections.

J. Install conduit sealing fittings in hazardous areas. Fill with compound.

K. Minimum conduit size for lighting and power circuits: 21 mm (3/4”).

L. Install electrical metallic tubing (EMT) from computer room branch circuit panel to outlet boxes located in sub-floor.

M. Bend conduit cold. Replace conduit if kinked or flattened more than one-tenth (1/10th) of its original diameter.

N. Mechanically bend steel conduit over 20 mm (3/4") diameter.

O. Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

P. Install fish tape in empty conduit.

Q. Run two (2) 27 mm (1") spare conduits up to ceiling space and down to floor space from each flush panel. Terminate these conduits in 150 mm x 150 mm x 100 mm (6" x 6" x 4") junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in surface type box on slab.

R. Remove and replace any obstructed sections of blocked conduit. Do not use liquids to clean out conduits.

S. Dry conduit before installing wire.

T. Power conduit and cables shall be at least 1 m (40") from automation conduit and cables.

U. Unless otherwise indicated, no conduit shall be buried in concrete.

3.02 CONDUIT FITTINGS

A. Use following types of electrical metallic tubing fittings, according to location:

1. Technical rooms (electrical rooms, mechanical rooms, etc.): compression.
2. Occupied areas, surface-mounted exposed conduit: compression.
3. Occupied areas, conduit concealed in walls and ceilings: locking screws.
4. All other locations not listed above: compression.

3.03 EXPOSED CONDUIT

A. Run parallel or perpendicular to building lines.

B. Install electrical conduit with 1.5 m (5') of clearance with heating devices.

C. Run conduit in flanged portion of structural steel.

D. Group conduit in surface-mounted U-channels, wherever possible.

E. Unless otherwise indicated, conduit shall not pass through structural members and no conduit supports shall be welded to structure.

F. Place conduit parallel to steam or hot water lines, leaving at least 75 mm (3") of lateral clearance and at least 25 mm (1") of vertical clearance between criss-crossing pipes and lines.

3.04 CONCEALED CONDUIT

A. Run parallel or perpendicular to building lines.

B. Installing horizontal runs in masonry walls is prohibited.

C. Installing conduit in terrazzo or concrete toppings is prohibited.