Consortium Avataa/Stavibel

Public Works and Canada Government Services

Kuujjuaq Airport

Development of the multi-purpose building site

Technical Specifications

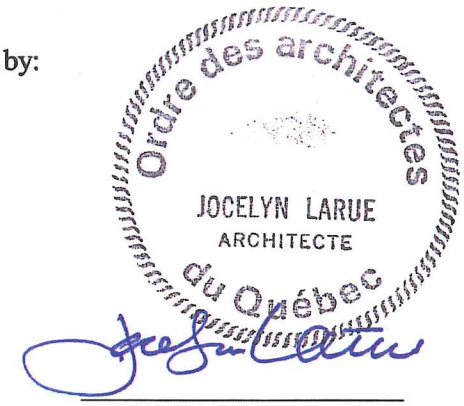
Project N° R.079464.001

Issued for tender May 2018

SEALS AND SIGNATURE PAGE

These tender documents have been prepared and audited by the undersigned:

Prepared by:



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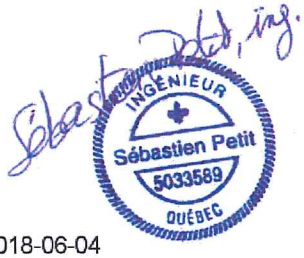

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2018-06-04

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Project Manager

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List of drawings

ARCHITECTURE

Part 1 GENERAL

1.1 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.

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

1.2 FUTURE WORK

.1 N/A

1.3 WORK SEQUENCE

.1 Carry out the work in stages to allow continued use of the premises by the Departmental Representative during the work in accordance with Section 01 35 13.13 - Special Procedures - Airport Facilities.

.2 Maintain an open lane at all times in accordance with Section 01 35 00.06 - Special Procedures - Traffic Control.

1.4 CONTRACTOR USE OF PREMISES

1. The work of this contract includes the expansion and renovation of the multi-purpose building at Kuujjuaq Airport, Quebec and includes but is not limited to the following

.1 The work referred to in this specification includes the expertise, labor, materials, fittings, equipment and services required for the design, supply, installation and removal Concrete formwork in accordance with the drawings, this specification and the contract documents.

.2 The work in this specification includes the expertise, labor, materials, equipment and services required to perform the supply, manufacture, transportation and assembly of structural steel in accordance with the drawings, The present specification and the contract documents.

.3 The work in this section includes all the structural steel shown on the structural drawings and their finishes.

.4 The excavation and backfilling of this construction contract shall include all that is required for the proposed construction, regardless of the method of construction adopted.

.5 Excavation work includes clearing, removal and transportation of all materials encountered of any kind, including brush, trees, stumps, debris, abandoned service lines, old foundations, paving, Earth, rock, etc. To permit the construction of all structures, in the specified manner, at the specified lines and levels.

.6 Backfilling includes the provision and placement of backfill materials and their compaction to the level shown in the drawings.

.7 In addition, the Contractor shall include in the tendered price the proper cleaning and depletion of the water, final leveling and finishing by hand of the excavation, with a view to placing concrete or other concrete materials. The Contractor must

read the geotechnical study in detail as it attempts to demonstrate the presence of water below ground level.

.8 The Contractor shall also include in the tendered price the support of the excavations and the necessary protective work to ensure the safety of the workers and the neighboring works (buildings, sidewalks, conduits, poles, etc.).

.9 Include excavation and backfilling required for the construction of soles, walls, floor slabs, sumps, gutters, pits, equipment bases, sidewalks, bollards, buried ducts Electricity or mechanics and any other work of the same type as shown on the drawings of structure, architecture, exterior design, mechanics or electricity.

.10 Local excavation and backfilling of exterior walls of new construction are included in this section. If the specifications for the external works are more restrictive they will take precedence over the present specifications.

.11 Provide, install and connect a new generator. Dismantle the existing group.

.12 Redevelopment of electrical distribution.

.13 Provide, install and connect all lighting equipment as indicated on plans.

.14 The Contractor shall verify and confirm the information relating to the facilities and services of existing buildings before carrying out the dismantling and repair work.

.15 The Contractor-Electrician must provide for all required demolition. In addition, it must remove all the wiring to the outlet boxes feeding the removed appliances. Maintain electrical continuity of other equipment.

.16 All wiring and distribution equipment, panels, circuit breakers, disconnectors, starters, connectors, distribution box, terminal blocks, etc.

.17 The installation of a network of conduits, wiring and boxes for all special systems provided by the customer (telecommunication, etc.).

.18 Connection of all equipment requiring electricity, whether supplied by the contractor of this section, by contractors of other sections, by the departmental representative or by others.

.19 Provide, install and connect all outlets, as shown on plans.

.20 Provide, install and connect emergency power distribution equipment

.21 Provide connection and power to all ventilation, plumbing and air conditioning equipment at 120 Volts and more.

.22 Provide all required wiring for new distribution systems.

.23 Provide, install and connect new fire alarm systems.

.24 All work shown on plans.

.25 The Mechanical Contractor shall provide for all demolitions required. The pipes and ducts must be dismantled to the point of connection on the main lines.

.26 Provide all equipment and accessories necessary for the proper functioning of mechanical systems.

.27 Provide and install domestic plumbing, sanitary drainage and fuel oil networks. Provide and install ventilation distribution systems and any other system for the distribution of air evacuation and treatment. Supply and install all equipment, controllers and wiring necessary for automatic regulation on mechanical and electrical documents.

1.5 OCCUPANCY BY THE CONTRACTOR

.1 Site may be used without restriction until substantial completion of work.

.2 Coordinate use of premises with Departmental Representative.

1.6 OCCUPANCY BY THE DEPARTMENTAL REPRESENTATIVE

.1 The Departmental Representative will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with the Departmental Representative in scheduling operations to minimize conflict and to facilitate the Departmental Representative usage.

1.7 ITEMS SUPPLIED BY THE DEPARTMENTAL REPRESENTATIVE

.1 Departmental Representative Responsibilities:

- .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
- .2 Arrange for replacement of damaged, defective or missing items.

.2 Contractor Responsibilities:

- .1 Designate submittals and delivery date for each product in progress schedule.
- .2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
- .3 Receive and unload products at site.
- .4 Inspect deliveries jointly with the Departmental Representative; record shortages, and damaged or defective items.
- .5 Handle products at site, including unpacking and storage.
- .6 Protect products from damage, and from exposure to elements.
- .7 Assemble, install, connect, adjust, and finish products.
- .8 Provide installation inspections required by public authorities.
- .9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

.3 Material and equipment

- .1 All materials and materials required for the performance of the Work shall be provided and paid for by the Contractor

1.8 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.

1.9 EXISTING UTILITY SERVICES

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Provide alternative routes for personnel and vehicular traffic.

.3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

1.10 REQUIRED DOCUMENTS

.1 Maintain at job site, one copy 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 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

1.11 GEOTECHNICAL STUDY

.1 A geotechnical study is available for consultation at the office of the Departmental Representative. Appendix A entitled "Survey Reports" provides the survey reports for the geotechnical study.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 ACCESS AND EGRESS

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

1.02 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.03 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.04 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for personnel and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures .

1.05 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Ingress and egress of Contractor vehicles at site is limited, controlled at the access barrier.

1.06 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

1.07 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by [Departmental Representative] [DCC Representative] [Consultant] to enable monitoring of project work in relation to established milestones.

1.02 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative] within 5 working days of receipt of acceptance of Master Plan.

1.04 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative] will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.05 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Excavation.
- .6 Building footings.
- .7 Structural Steel.
- .8 Siding and Roofing.
- .9 Interior Architecture (Walls, Floors and Ceiling).
- .10 Plumbing.
- .11 Lighting.
- .12 Electrical.
- .13 Piping.
- .14 Controls.
- .15 Heating, Ventilating, and Air Conditioning.
- .16 Millwork.
- .17 Testing and Commissioning.

1.06 PHASING OF WORK

The Contractor must consider the specific requirements indicated in this section for phasing the execution of the works, in order to maintain the building's operation services.

The works will be subdivided into four (4) distinct phases, i.e.:

.1 Phase 1 – CCU Section of the Building

The work in this phase consists mainly of demolition of this section of the building, construction of the foundations on piles, concreting, the steel structure, architectural work, mechanical and electrical work for the building.

The Contractor must proceed with transporting the piles on the boat planned for mid-August, in order to respect the deadline for completing the foundations scheduled for mid-September 2018.

Work completion date: 2018-11-03.

.2 Phase 2 – Central section of the garage

The work in this phase mainly includes expanding 2 sections of the front garage. The work includes in summary demolition, construction of the foundations, erection of the structure, architectural work, mechanical doors for the heavy equipment, mechanical and electricity work.

Work completion date: 2018-10-27

.3 Phase 3 – South section of the garage

The work on the south section includes in summary the work to secure the property, improvement of the roof and siding of the building, installation of a kitchen, a restroom, installation of shelving and furniture, mechanical and electricity work and replacement of the generator and heating system, including building lighting and controls.

Work completion date: 2018-12-01

.4 Phase 4 – North section of the garage

The work on the north section of the garage includes in summary the reroofing and the application of the siding, replacement of the door hardware, finishing the floors, mechanical and electricity work.

Work completion date: 2018-11-03

1.07 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.08 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.02 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada when instructed by the section.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 10 days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental

Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, in [duplicate], containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit one (1) electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.11 Submit one (1) electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .2 Testing must have been within three (3) years of date of contract award for project.

.12 Submit one (1) electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material

meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.13 Submit one (1) electronic copy of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.14 Submit one (1) electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit one (1) electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.20 The review of shop drawings by Public Works and Government Services Canada (PSPC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PSPC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.03 SAMPLES

.1 Submit for review samples in triplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representativ may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.04 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, fine resolution monthly with progress statement as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints
- .1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: weekly as directed by Departmental Representative.
- .1 Upon completion of: excavation, foundation, framing and services before concealment, of Work,] as directed by Departmental Representative.

1.05 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 For work on or near road right-of-ways, Contractor shall control road traffic.

1.2 REFERENCES

.1 Ministère des Transports du Québec

.1 Tome V des Normes des ouvrages routiers intitulé « Signalisation routière »;

.2 CCDG, édition 2014.

1.3 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 When working on travelled way:

.1 Place equipment in position to minimize interference and hazard to travelling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.3 Close lanes of road only after receipt of written approval from Departmental Representative.

.1 Before re-routing traffic erect suitable signs and devices according to “Tome V, Signalisation routière”.

.4 Construct an access road to the lot adjacent to the site, and to any other indicated area, unless there are other access routes authorized by the Departmental Representative and maintain them.

1.4 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices according to “Tome V, Signalisation routière” des Normes des ouvrages routiers du ministère des Transports du Québec.

.3 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Departmental Representative.

.4 Continually maintain traffic control devices in use:

.1 Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Remove or cover signs which do not apply to conditions existing from day to day.

1.5 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag personnel, trained in accordance with, and properly equipped according to “Tome V, Signalisation routière” des Normes des ouvrages routiers du ministère des Transports du Québec.

.1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.7 Delays to public traffic due to contractor's operators:[15] minutes maximum.

.2 Where roadway, carrying two-way traffic, is restricted to one lane, for 24 hours each day, provide portable traffic signal system.

.1 Adjust, as necessary, and regularly maintain system during period of restriction.

.2 Ensure signal system meets requirements according to “Tome V, Signalisation routière” des Normes des ouvrages routiers du ministère des Transports du Québec.

1.6 PAYMENT

.1 Costs for traffic control procedures are included in tender unit prices.

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Not Used.

1.2 GENERAL PROTECTION

.1 Do not disrupt airport business except as permitted by Departmental Representative.

.2 Provide temporary protection for safe handling of public, personnel, pedestrians and vehicular traffic.

.3 Provide barricades and lights where directed by Departmental Representative.

1.3 MOVEMENT OF EQUIPMENT AND PERSONNEL

.1 In areas of airport not closed to aircraft traffic:

.1 Obtain Departmental Representative's approval on scheduling of Work.

.2 Control movements of equipment and personnel as directed by Departmental Representative.

.3 Provide qualified field personnel at locations designated by Departmental Representative to relay signals from airport traffic control tower to equipment and personnel wishing to cross live traffic areas.

.4 Immediately obey signals from airport traffic control tower.

1.4 UNSERVICEABLE AREAS

.1 Mark off areas made unserviceable for aircraft by Work of this Contract by providing highly visible danger markings by day and red lights by night.

.2 Open flames and flammable fuels are not permitted.

.3 Park equipment not in use and stockpile materials so that stockpile tops are below 50 to 1 ratio from ends of useable landing strip and below 20 to 1 ratio from sides of aircraft traffic areas.

.1 Mark tops with red lights as directed by Departmental Representative.

1.5 TRENCHING

.1 Obtain Departmental Representative's written permission to undertake trenching on pavements open to aircraft traffic which cannot be completed, backfilled and sealed within 1 working day.

1.6 AIRPORT FACILITIES

.1 Departmental Representative will stake or indicate location of underground facilities such as cables, pipes, ducts and other services and utilities.

.2 Notify Departmental Representative of work areas [48] hours minimum in advance of operations to allow sufficient time for underground facilities and service to be located.

Part 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

GENERAL NOTE: in this section the term “site” includes all the facilities located at the site where the work is taking place (construction site, buildings, access, infrastructure, parkings, bays, access road, etc.).

1.1 RELATED REQUIREMENTS

.1 Not applibale.

1.2 REFERENCES

.1 Province of Québec

.1 Loi sur la santé et la sécurité du travail L.R.Q., c. S-2.1 (Act respecting occupational health and safety).

.2 Code de sécurité pour les travaux de construction L.R.Q., c. S-2.1, r.4 (Safety code for the construction industry).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative and the CNESST the site-specific prevention program, as outlined in the article “GENERAL REQUIREMENTS”, at least 10 days prior to the start of work.

.3 Departmental Representative will review Contractor’s site-specific prevention program and provide comments to Contractor within 10 days after receipt of the document. Revise plan as appropriate and resubmit to Departmental Representative within 5 days after receipt of comments from Departmental Representative. Departmental Representative reserves the right not to authorize the start of work on the construction site as long as the content of the prevention program is not satisfactory. The Contactor shall then update his prevention program and resubmit it to the Departmental Representative if the scope of work changes or if the working methods of the Contractor differ from his initial plans or for any other applicable new condition.

.4 Departmental Representative’s review of Contractor’s site-specific prevention program should not be construed as approval of the program and does not reduce the Contractor’s overall responsibility for construction Health and Safety during the work.

.5 Submit copies of Contractor’s authorized representative’s construction site health and safety inspection reports to Departmental Representative, [determine frequency, but at least once a week].

.6 Submit to Departmental Representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit to Departmental Representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard. The investigation report shall contain at least the following:

.1 Date, time and place of accident;
.2 Name of sub-contractor involved in the accident;
.3 Number of persons involved and condition of wounded;
.4 Witness Identification;
.5 Detailed description of tasks performed at the time of the accident;
.6 Equipment being used to accomplish the tasks performed at the time of the accident;
.7 Corrective measures taken immediately after the accident;
.8 Causes of the accident;
.9 Preventive measures that have been put in place to prevent a similar accident.

.8 Submit to Departmental Representative WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 – Submittals. Contractor must also keep one copy of these documents on the construction site.

.9 Medical Surveillance: where prescribed by legislation, regulation or prevention program, submit certification of medical surveillance for construction site personnel prior to commencement of Work, and submit additional certifications for any new construction site personnel to Departmental Representative.

.10 Submit to Departmental Representative an on-site Emergency Response Plan at the same time as the prevention program. The Emergency Response plan must contain the elements listed in the article “GENERAL REQUIREMENTS” of this section.

.11 Submit to Departmental Representative copies of all training certificates required for the application of the prevention program, in particular (if applicable) for the following:

.1 First aid in the workplace and cardiopulmonary resuscitation;
.2 Work likely to release asbestos dust (mandatory for all work where asbestos is present);
.3 Work in confined spaces (mandatory for all work in confined spaces);
.4 Lockout-tagout procedures (mandatory for all work requiring lockout);
.5 Safely operating forklift trucks (mandatory for all forklift usage);
.6 Safely operating elevating work platforms (mandatory for the use of all elevating platforms);
.7 Any other requirement of Regulations or the safety program.

.12 In addition, the certifications of the *Cours de santé et sécurité générale pour les chantiers de construction* (General Health and Safety Training for Construction Sites) shall be available on demand on the construction site.

.13 Engineer’s plans and certificates of compliance: Contractor must submit to the Departmental Representative and to the *Commission des normes, de l’équité, de la santé et de la sécurité du travail* (CNESST) a copy signed and sealed by engineer of all plans and certificates of compliance required pursuant to the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry) or by any other legislation or regulation or by any other clause in the specifications or in the contract. The Contractor must also submit a certificate of conformity signed by an engineer once the

facility for which these plans were prepared has been completed and before a person uses the facility. A copy of these documents must be available on site at all times.

1.4 FILING OF NOTICE OF CONSTRUCTION SITE OPENING

.1 Notice of construction site opening shall be submitted to the CNESST before work begins. A copy of such notice and acknowledgment of receipt from the CNESST shall be submitted to Departmental Representative.

.2 At the completion of all the work, a notice of construction site closing shall be submitted to the CNESST, with a copy to Departmental Representative.

.3 The Contractor shall assume the role of being the Principal Contractor in the limits of the construction site and elsewhere where he must execute work within the framework of this project. The Contractor shall recognize the responsibility of being the Principal Contractor of the project and identify himself as such in the notice of the construction site opening he provides to the CNESST.

.4 The Contractor shall accept to divide and identify the construction site adequately in order to define time and space at all times throughout the course of the project.

1.5 HAZARD ASSESSMENT

.1 The contractor must perform construction site specific safety hazard assessment related to project.

1.6 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

.2 Contractor’s representative with decision power must attend any meetings at which construction site safety and health issues are to be discussed.

.3 If it is anticipated that there will be 25 workers or more on the construction site at any given time, the Contractor shall set up a worksite committee and hold meetings as required by the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4) (Safety code for the construction industry). A copy of the minutes of the meetings of the committee shall be provided to the Departmental Representative no later than 5 days after the committee meeting.

1.7 REGULATORY REQUIREMENTS

.1 Do the Work in accordance with Section 01 35 00.06 – Special procedures – Traffic control.

.2 Comply with all legislation, regulations and standards applicable to the construction site and its related activities.

.3 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.

.4 Always use the most recent version of the standards specified in the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), notwithstanding the date indicated in that *Code.*

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with the *Loi sur la santé et la sécurité du travail* (L.R.Q., c. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4.) (Safety code for the construction industry) in addition to respecting all the requirements of this specification manual.

1.9 RESPONSIBILITIES

.1 The Contractor must acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the *Loi sur la santé et la sécurité du travail* (L.R.Q., ch. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry).

.2 The Contractor must be responsible for health and safety of persons on construction site, safety of property on construction site and for the protection of persons adjacent to construction site and the environment to the extent that they may be affected by conduct of the work.

.3 No matter the size or location of the construction site, the Contractor must clearly define the limits of the construction site by physical means and respect all specific regulation requirements applicable in this regard. The means chosen to define the limits of the construction site must be submitted to the 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 site-specific prevention Plan.

1.10 WORK PERFORMED BY EXTERNAL CONTRACTORS

.1 On this construction site, it is anticipated that some work may be performed by an external contractor that has not been hired by the Contractor.

.2 The Contractor must take the necessary steps to protect the health and safety of external contractors that have no contractual link with the Contractor but have been mandated by the Departmental Representative to perform certain work. In return, these external contractors are obligated to submit to the authority of the Contractor (Principal Contractor). A subordination agreement must be signed by the Contractor and by each external contractor to this effect and submitted to the Departmental Representative prior to the start of the work of each contractor (see the wording in the article HEALTH AND SAFETY SUBORDINATION AGREEMENT)

1.11 GENERAL REQUIREMENTS

.1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article “HAZARD ASSESSMENT” and the article “RISKS INHERENT TO THE WORKSITE” in this section. Apply this program in its totality from the start of the project until demobilization of all personnel from the construction site.

.2 The prevention program shall take into consideration the specific characteristics of the project and cover all the work to be executed on the construction site.

.3 The safety program must include at least the following:

.1 Company safety and health policy;

.2 Description of the stages of the work;

.3 Total costs, schedule and projected workforce curves;

.4 Flow chart of safety and health responsibilities;

.5 Physical and material layout of the construction site;

.6 Risk assessment for each stage of the work, including preventive measures and the procedures for applying them;

.7 Identification of the preventive measures relative to the specific risks inherent to the worksite indicated in the article “RISKS INHERENT TO THE WORKSITE”;

.8 Identification of preventive measures for health and safety of employees and / or public works site as indicated in the article “SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC”;

.9 Training requirements;

.10 Pprocedures in case of accident/injury;

.11 Written commitment from all parties to comply with the safety program;

.12 Construction site inspection cheklist based on the preventive measures;

.13 Emergency response plan which shall contain at least the following:

.1 Construction site evacuation procedures;

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

.3 Identification of persons in charge of the construction site;

.4 Identification of the first-aid attendants;

.5 Communication organizational chart (including the person responsible for the site and the Departmental Representative);

.6 Training required for those responsible for applying the plan;

.7 Any other information needed, in the light of the construction site’s characteristics.

.14 If available the Departmental Representative will provide the evacuation procedures to the Contractor who shall then coordinate the construction site procedure with that of the site and submit it to the Departmental Representative.

.4 Departmental Representative may respond in writing, where deficiencies or concerns are noted in the prevention program and may request resubmission with correction of deficiencies or concerns.

.5 In addition to the prevention program, during the course of the work the Contractor shall elaborate and submit to the Departmental Representative specific written procedures for any work having a high risk factor of accident (for example: demolition procedures, specific installation procedures, hoisting plan, procedures for entering a confined space, procedures for interrupting electric power, etc.) or at the request of the Departmental Representative.

.6 The Contractor shall plan and organize work so as to eliminate the danger at source or ensure collective protection, thereby minimizing the use of personal protective equipment.

.7 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.

.8 All mechanical equipment (for example, but not limited to: hoisting devices for persons or materials, excavators, concrete pumps, concrete saws) shall be inspected before delivery to the construction site. Before using any mechanical equipment, the Contractor shall obtain a certificate of compliance signed by a qualified mechanic dated less than a week prior to the arrival of each piece of equipment on the construction site; the certificate shall remain on the construction site and transmitted to the Departmental Representative on demand.

.9 Ensure all inspections (daily, periodic, annual, etc.) for the hoisting devices for persons or materials required by the current standards are carried out and be able to provide a copy of the inspection certificates to the Departmental Representative on demand.

.10 The Departmental Representative can at all times, if he suspects a malfunction or the risk of an accident, order the immediate stop of any piece of equipment and require an inspection by a specialist of his choice.

.11 The Departmental Representative must be consulted for the location of storing gas cylinders and tanks on the construction site.

1.12 RISKS INHERENT TO THE WORKSITE

.1 In addition to the risks related to the tasks to be carried out, personnel responsible for the execution of the work on the construction site will be exposed to the following risks inherent to the area where the work will be executed.

.2 At the worksite there is in particular the presence of the following:

- .1 Materials containing asbestos
- .2 Materials containing lead
- .3 Moulds
- .4 Other dangerous materials (specify)
- .5 Confined spaces
- .6 Overhead power lines
- .7 Underground services (electric, gas, vapour, water system, etc.)
- .8 Laboratories
- .9 Trees and landscaping to preserve and protect
- .10 Potentially unstable ground
- .11 Barbed wire fences

.3 The Contractor shall process to a risk assessment of the site to validate this information and see if other risks are present on the site. He must include in its prevention program all risks that have been identified.

1.13 SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC

.1 The worksite is occupied by employees and/or the public during the following times: [specify the times]. The Contractor shall consider the following specific requirements for the protection of employees and / or the public:

.1 Construct interior and exterior temporary partitions in compliance with drwings and specifications, and this for every phase of the project.

.2 These requirements must be included in the Contractor's site-specific safety plan as well as any other measures provided by the Contractor to protect the health and safety of employees and / or the public on the site.

1.14 UNFORESEEN HAZARDS

.1 Whenever a source of danger not defined in the specifications or identified in the preliminary construction site inspection arises as a result of or in the course of the work, the Contractor must immediately suspend work, notify the person responsible for health and safety on the construction site, take appropriate temporary measures to protect the workers and the public and notify Departmental Representative, both verbally and in writing. Then the Contractor must do the necessary modifications to the prevention program or apply the security measures required in order to resume work.

1.15 PERSON IN CHARGE OF HEALTH AND SAFETY

.1 If the construction site meets the requirements of article 2.5.3 of the *Code the sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), the Contractor needs to hire a competent person authorized as a safety officer and appoint this person full time from the beginning of the work. This person's tasks shall solely be dedicated to the management of health and safety on the construction site. This safety officer must have the following qualifications:

.1 Have a safety officer certificate issued by the CNESST since at least 1 year;

.2 Have site-related working experience specific to the activities associated with the present project;

.3 Have working knowledge of occupational health and safety regulations in the workplace;

.4 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter the construction site to perform work;

.5 Be responsible for implementing, enforcing in detail and monitoring site-specific Contractor's Health and prevention program;

.6 Be on construction site at all times during execution of work;

.7 Inspect the work and ensure compliance with all regulatory requirements and those indicated in the contract documents or the site-specific prevention program.

.8 Keep a daily log of actions taken and submitting a copy to Departmental Representative each week.

.2 The safety officer's certificate shall be submitted to the Departmental Representative before the start of the work.

.3 When the hiring of a safety officer is not required or if this person is hired by the Departmental Representative, the Contractor shall designate a competent person to supervise and take responsibility for health and safety, no matter the size of the construction site or how many workers are present at the workplace. This person shall be on construction site at all times and be able to take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the construction site and likely to be affected by any of the work. The Contractor shall submit the name of this person to the Departmental Representative before the start of work.

1.16 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on construction site in accordance with Acts and Regulations of the Province, and in consultation with Departmental Representative.

.2 At a minimum, the following information and documents must be posted in a location readily accessible to all workers:

.1 Notice of construction site opening;
.2 Identification of principal Contractor;
.3 Company OSH policy;
.4 Site-specific prevention program;
.5 Emergency plan;
.6 Minutes of worksite committee meetings;
.7 Names of worksite committee representatives;
.8 Names of the first-aid attendants;
.9 Action reports and correction notices issued by the CNESST.

1.17 INSPECTION OF THE CONSTRUCTION SITE AND CORRECTION OF NON-COMPLIANCES

.1 Inspect the construction site and complete the construction site inspection checklist and submit it to the Departmental Representative in accordance with the article “ACTION AND INFORMATIONAL SUBMITTALS” in this section.

.2 Immediately take all necessary measures to correct any situations deemed non-compliant during the inspections mentioned in the previous paragraph or noticed by the authorities having jurisdiction or the Departmental Representative or his agent.

1.18 PREVENTION OF VIOLENCE

.1 Health and safety management of Public Works and Government Services Canada construction sites includeS the implementation of measures designed to protect the psychological health of all persons who access the construction site where the work is taking place. Consequently, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the construction site. Any person who demonstrates such actions or behaviors will receive a warning and/or could be definitely expelled from the construction site by the Departmental Representative.

1.19 POWDER ACTUATED DEVICE

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

.2 Any person using an explosive actuated tool shall hold a training certificate and meet all requirements of Section 7 of the *Code the sécurité pour les travaux de construction* (S- 2.1, r. 4). (Safety code for the construction industry)

.3 Any other explosive-actuated device shall be used in accordance with the manufacturer's directions and applicable standards and regulations.

1.20 USE OF PUBLIC ROADS

.1 Where it is necessary to encroach on a public road for operational reasons or to ensure the security of the workers, the occupants or the public (for example: the use of scaffolding, cranes, excavation work, etc.), the Contractor shall obtain at his own expense any authorizations and permits required by the competent authority.

.2 The Contractor shall install at his own expense any signage, barricades or other devices needed to ensure the safety and security of the public and the Contractor's own facilities.

1.21 LOCKOUT-TAGOUT

.1 For all work on electrically or otherwise energized equipment, the Contractor shall draw up and implement a general lockout-tagout procedure and submit it to the Departmental Representative.

.2 Supervisors and all workers concerned by work requiring lockout-tagout must have received training on lockout-tagout procedures by a recognized organization; Contractor shall submit training certificates to the Departmental Representative.

.3 Before starting the lockout-tagout procedure of a piece of equipment on an occupied site, Contractor must coordinate his work with the representative of the site if the interruption of the power sources can have an impact on the operations of the site or on its occupants.

.4 Contractor must designate a qualified person as responsible for the lockout-tagout and must make sure that that person prepares a lockout-tagout data sheet for each piece of equipment involved. The lockout-tagout data sheet must be submitted to the Departmental Representative at least 48 hours before the beginning of the work. The Departmental Representative will review the data sheet with the representative of the site if the work takes place in an existing building.

.5 The data sheets for lockout-tagout must contain at least the following information:

.1 Description of work to carry out;

.2 Identification, description and location of the circuit and/or ~~piece of~~ equipment to lockout-tagout;

.3 Identification of energy sources that feeds the ~~piece of~~ equipment;

.4 Identification of each cutout point;

.5 Sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;

.6 List of material needed for the lockout-tagout;

.7 Method of verification of zero energy implementation;

.8 Name and signature of the person who prepared the data sheet.

.6 When required by the Departmental Representative, Contractor must record all this information on the site's representative form.

.7 At the time of lockout-tagout, the person responsible must date the data sheet and ensure that each worker involved in the work on the circuit/equipment to lockout-tagout puts his name on the data sheet and signs it.

1.22 ELECTRICAL WORK

.1 Contractor shall ensure that all electrical work is executed by qualified employees in accordance with the provincial regulation respecting vocational training and qualification.

.2 Contractor shall respect all requirements of standard CSA Z462 *Workplace Electrical Safety Standard*.

.3 No repairs or alterations shall be carried out on any live equipment except where complete disconnection of the equipment is not feasible.

.4 Contractor shall respect all requirements prescribed in paragraph "LOCKOUT-TAGOUT" in this section.

.5 Contractor shall advise in writing the Departmental Representative of all the work that cannot be done with de-energized equipment and obtain his authorization. Contractor shall demonstrate to the Departmental Representative that it is impossible to do the work with de-energized equipment and provide all the information necessary to request and obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) before the beginning of the work, excluding for the exceptions indicated in standard CSA Z462 Workplace electrical safety.

.6 The energized electrical work permit on must contain at least the following elements:

.1 Description of the circuit and equipment and its location;

.2 Justification d for having to do the work in an energized condition;

.3 Description of safe work practices to apply;

.4 Results of the shock hazard analysis;

.5 Limit of the protective perimeter against electric shocks;

.6 Results of the arc flash hazard analysis;

.7 Description of the arc flash protection boundary;

.8 Description of the personal protective equipment required;

.9 Description of the means to limit access to unqualified persons;

.10 Proof that an information session has been carried out;

.11 Approval signature of the energized electrical work (by a person in authority or by the owner).

.7 If for the operational requirements of the occupants of the site the representative of the site requires that the Contractor performs work in an energized condition, the Contractor shall obtain all the information required to request and obtain obtain an energized

electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) and have it signed by the representative of the site assigned by the Departmental Representative before the beginning of the work.

1.23 ASBESTOS EXPOSURE

.1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials containing asbestos; however, if the Contractor or the Departmental Representative or his agent discover materials which are susceptible of containing asbestos, the Contractor must immediately stop the work and advise the Departmental Representative. If more investigation demonstrates that the materials do contain asbestos, the Contractor shall comply with the following requirements. Prior to starting any work likely to emit asbestos dust, the Contractor must:

.1 Provide a written procedure for the work, identifying the risk level of the work (low, moderate, high), as defined in section 3.23 of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry). This procedure must take into account all the requirements of that section 3.23.

.2 Submit certificates that demonstrate that all workers involved in the work have received training on asbestos hazards and on the procedure required in the preceding paragraph.

.3 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.24 FUNGAL CONTAMINATION

.1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials contaminated by mould; however, if the Contractor or the Departmental Representative or his agent discover materials which are susceptible of being contaminated by mould, the Contractor must immediately stop the work and advise the Departmental Representative. If more investigation demonstrates that the materials do contain mould, the Contractor shall comply with the following requirements.

.2 Prior to starting any work where workers are likely to be in contact with materials contaminated by mould, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in the document "*Mould Guidelines for the Canadian Construction Industry*" published by the Canadian Construction Association (http://www.cca-acc.com/documents/electronic/cca82/cca82.pdf)

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.25 EXPOSURE TO SILICA

.1 Work in wet environment or use tools with the inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high-efficiency filters not to propagate dust in the environment.

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

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

.4 Install shields or other containment device to prevent silica dust from migrating toward other workers or the public.

.5 Wear individual respiratory and ocular protection equipment during all the operations that could generate silica dust in accordance with the requirements of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry).

.6 Wear coveralls to prevent contamination outside the construction site.

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

.8 Wash the hands and the face before drinking, eating or smoking

1.26 SANDBLASTING

.1 Prior to starting any sandblasting work, the Contractor must:

.1 Provide a written procedure of the work that meets the requirements of section *3.20.*of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the Construction Industry).

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

.3 All sanding and sandblasting work shall be done by using an abrasive containing less than 1% of silica.

1.27 LEAD-BASE PAINT REMOVAL

.1 Prior to all work where workers are likely to handle materials containing lead-base paint or other substances containing lead, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code de sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in the document "*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). If there is a discrepancy between the Québec regulation and the Ontario document, the most stringent requirement shall apply.

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.28 EXPOSURE TO ANIMAL'S FECAL DROPPINGS

.1 Prior to all work where workers are likely to come in contact with materials contaminated by animal's fecal droppings, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety code for the construction industry), as well as the requirements indicated in the document "*Des fientes de pigeons dans votre lieu de travail: méfiez-vous"*

(Pigeon droppings in your workplace: Beware" published by the CNESST (http://www.csst.qc.ca/publications/100/Documents/DC100_1331_1web2.pdf).

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.29 RESPIRATORORY PROTECTION

.1 Contractor must ensure that all workers who must wear a respirator as part of their duties have received training for that purpose as well as fit testing of their respirator, in accordance with CSA Standard Z94.4 *Selection, use and care of respirators*. Submit the certificates of the fit testings to the Departmental Representative on demand.

1.30 FALL PROTECTION

.1 Plan and organize work so as to eliminate the risk of fall at the source or ensure collective protection, thereby minimizing the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness that complies with CSA standard CAN/CSA Z-259.10 M90. A safety belt must not be used as fall protection.

.2 Every person using an elevating platform (scissors, telescopic mast, articulated mast, rotative mast, etc.) must have a training regarding this equipment.

.3 The use of a safety harness is mandatory for all elevating platforms with telescopic, articulate or rotative mast.

.4 Define the limits of the danger zone around each elevating platform.

.5 All openings in a floor or roof must be surrounded by a guardrail or provided with a cover fixed to the floor able to withstand the loads to which it could be exposed, regardless of the size of the opening and the height of the fall it represents.

.6 Everyone who works within two metres from a fall hazard of three metres or more must use a safety harness in accordance with the requirements of the regulation, unless there is a guardrail or another device offering an equivalent safety.

.7 Despite the requirements of the regulation, the Departmental Representative may require the installation of a guardrail or the use of a safety harness for specific situations presenting a risk of fall less than three metres.

1.31 SCAFFOLDINGS

.1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Contractor who uses scaffoldings must respect the following requirements:

.1 <u>Foundation</u>

.1 Scaffoldings shall be installed on a solid foundation so that it does not slip or rock.

.2 Contractors wishing to install scaffoldings on a roof, overhang, canopy or awning shall submit their calculations and loads, as well as plans signed and sealed by an engineer to the Departmental Representative and obtain his authorization before beginning installation.

.2 Assembly, bracing and mooring

.1 All scaffoldings shall be assembled, braced and moored in accordance with the manufacturer's instructions and the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry).

.2 Where a situation requires the removal of part of the scaffoldings (e.g., crosspieces), the Contractor shall submit to the Departmental Representative an assembly procedure signed and sealed by an engineer certifying that the scaffolding assembled in that manner will allow the work to be done safely given the loads to which it will be subject.

.3 For scaffoldings where the span between two supports is greater than three metres, the Contractor shall provide the Departmental Representative an assembly plan signed and sealed by an engineer.

.3 Protection agains falls during assembly

.1 Workers exposed to the risk of falling more than three metres shall be protected against falls at all times during assembly.

.4 Platforms

.1 Scaffolding platforms shall be designed and installed in accordance with the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry).

.2 If planks are used, they shall be approved and stamped in accordance with section 3.9.8 of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry)

.3 Scaffoldings of four sections (or six metres) high or more shall have a full platform covering the entire surface between the putlogs every three metres high or fraction thereof, and the components of that platform shall not be moved at any time to create an intermediate landing.

.5 Guardrails

.1 A guardrail shall be installed on every landing.

.2 Cross braces shall not be considered as guardrails.

.3 If the platforms are not covering the entire surface between the putlogs, the guardrail must be installed just above the edge of the platform so that there is no empty horizontal space between the platform and the guardrail.

.4 Where scaffoldings has four sections (or six metres) high or more and full platforms are required, the guardrails shall be installed on each landing at the start of work and shall remain in place until the work is completed.

.6 Access

.1 The Contractor shall ensure that access to the scaffoldings does not compromise worker safety.

.2 Where the platforms of the scaffoldings are comprised of planks, ladders shall be installed in such a way that planks extending beyond the platform do not block the way up or down.

.3 Notwithstanding the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), stairs shall be installed on all scaffoldings that have six or more rows of uprights or is six sections (or nine metres) high or higher.

.7 Protection of the public and occupants

.1 When scaffoldings are installed in a zone accessible to the public, the Contractor shall take the necessary measures to prevent the public from having access to them and, if applicable, to the work or storage area located in the vicinity of these scaffolding.

.2 Contractor must install covered walkways, nets or other similar devices to protect workers, the public and the occupants against falling objects. The means of protection must be approved by the Departmental representative.

.8 Engineering plans

.1 In addition to those required by the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Departmental Representative reserves the right to require engineering plans for other types or configurations of scaffoldings.

.2 A plan signed and sealed by an engineer is required for all scaffoldings that will be covered with a canvas, a tarpaulin or any other material that has wind resistance.

.3 A certificate of conformity signed by an engineer is required in all cases where an engineering plan is required before anybody uses the facility. A copy of these documents must be available on the construction site at all times.

1.32 CONFINED SPACES

.1 In addition to the requirements of the provincial regulation applicable to confined spaces, the Contractor must respect the requirements in the following paragraphs.

.2 The Departmental Representative reserves the right, depending on the nature of the risk of the confined spaces, of the work to be done and/or of the level of competence in confined spaces demonstrated by the Contractor, to require from the latter that he use the services of a firm specialized in health and safety or in confined space work to perform the analysis of the risks inherent to the confined spaces, to complete the entry permit, to conduct surveillance of the work or for any other task related to the work in confined spaces.

.1 Information on confined spaces existing on the construction site

.1 The Contractor shall take into consideration each of these confined spaces and must also add to this list the confined spaces that he is likely to build/install during this project.

.2 Person in charge of the health and safety for the work in confined spaces

.1 The Contractor shall designate a person to be in charge of the health and safety for the work in confined spaces. This person shall be qualified, as defined in the article 297 of the *Règlement sur la santé et la sécurité du travail* (S-2.1, r.13) (Occupational Health and Safety Regulation). This

person must be present at all times during work in confined spaces and must make sure that all the requirements of the regulation and the ones specified in this section are respected. This person must amongst other things fill out and issue the entry permit for the confined spaces.

.3 Training

.1 All persons having access to a confined space, including the person in charge and the watcher of the confined space shall have completed training on entry in confined spaces.

.2 All persons who have to use supplied-air respirator to access the confined spaces shall have completed training on the use of these apparatus.

.3 All persons identified as rescuers for confined spaces shall have completed training on confined spaces rescue.

.4 Each training required in the preceding paragraphs must be provided by a firm specialized in health and safety or in confined spaces.

.5 The training certificates of the persons mentioned above must be submitted to the Departmental Representative before the beginning of the work in confined spaces.

.4 Risk assessment of confined spaces

.1 For each of the confined spaces listed at the beginning of this article, the Contractor must obtain the necessary information from the site representative and proceed to the assessment of the risk inherent to each confined space and relative to:

.1 The prevailing internal atmosphere, namely the concentration of oxygen, inflammable gases and vapours, combustible or explosive dusts as well as the categories of contaminants likely to be present in this enclosed area or nearby;

.2 The fact that the natural or mechanical ventilation is insufficient

.3 The materials that are present there and that can cause the worker to sink, to be buried or to drown, such as sand, grain or a liquid;

.4 The interior configuration;

.5 Pipes and conduits penetrating the confined space;

.6 Eenergies such as electricity, moving mechanical parts, heat stress, noise and hydraulic energy;

.7 Ignition sources such as open flames, lighting, welding and cutting, static electricity or sparks;

.8 All other particular circumstances, such as the presence of vermin, rodents or insects.

.2 These risk assessments must be done by the person in charge of the health and safety of the work in confined spaces. They must be submitted to the Departmental Representative for analysis at least 10 days before the proposed date for the work in confined spaces and they must also include the following information:

.1 Location of the confined space;

.2 Description of the confined space;

.3 Dimensions of the confined space;

.4 Number, location and dimensions of the openings;

.5 Content of the confined space (material, substances, etc.)

.6 Date of the assessment;

.7 Name and signature of the person who conducted the assessment and the name of his employer.

.3 The Contractor must repeat the same process for each of the confined spaces that he will build/install during this project.

.5 Confined spaces entry permits

.1 For At least 5 days before the scheduled date for the work in a confined space the Contractor must submit for analysis to the Departmental Representative a copy of each entry permit specific to the confined spaces where he must access. The entry permits must be completed by the person in charge of the health and safety of the work in confined spaces, and must contain the following information as a minimum:

.1 Description of the work that will be carried out and the method of work, including the materials and tools needed to do this work;

.2 Description of the risks and corresponding preventive measures according to the risk assessment inherent to the confined space done previously and according to the work to be carried out;

.3 Safety equipment that will be used to control the risks of confined spaces (e.g.: fan, gas detectors, local exhaust ventilation, personal protective equipment, etc.);

.4 Rescue procedure covering at least the following:

a) means of communication between the supervisor of the confined space and the workers in the confined space;

b) lifesaving equipment specific to each confined space;

c) confirmation that the municipal emergency response service has been advised that work in confined spaces would be going on at this specific construction site and that they may intervene do to a confined space rescue; otherwise, the Contractor must identify the workers on the construction site that will act as rescuers in a confined space in the case where such rescuers must enter the confined space (rescue training is mandatory);

d) location of telephone and phone number of the municipal emergency response service (if applicable);

.5 Date of entry permit;

.6 Name of person who issued the permit and the name of his employer;

.7 Name of the confined space safety watcher and the name of his employer;

.8 Name of the workers who must enter the confined space and the name of each one's employer.

.2 In cases where the site representative requires the use of a confined space entry permit specific to his site, the Contractor must comply with the requirements of that permit.

.6 Medical Surveillance

.1 The Contractor must submit to the Departmental Representative a medical certificate dated in the last two years for all persons who must use a supplied-air respirator. The certificate must confirm the ability of each person to use this type of apparel.

.2 It is recommended that the persons who have to work in sewer collection systems or other similar systems be vaccinated against diphtheria, tetanus and hepatitis B.

.7 Requirements while working in confined spaces

.1 Before each entry into a confined space, the person in charge of the health and safety for the work in confined spaces shall take readings of oxygen concentration, flammable gases and all toxic gases likely to be present and record these readings on the entry permit required earlier.

.2 No worker can access the confined space if the following requirements are not respected:

.1 The concentration of oxygen shall be greater than or equal to 19.5% and less than or equal to 23%;

.2 Concentration of inflammable gases or vapours shall be less than or equal to 10% of the lower explosion limit;

.3 Concentration of other gases must not exceed the standards prescribed in annex I of the *Règlement sur la santé et la sécurité du travail* (S-2.1, r.13) (Occupational Health and Safety Regulation).

.3 If the oxygen and gas concentrations measured respect the regulatory values, the person in charge of the health and safety for the work in confined spaces must ensure that all preventive measures indicated on the permit are in place and then must complete the entry permit (date, time, signatures, etc.) before issuing the permit and allow entry into the confined space.

.4 A permit is only valid for one work shift; the Contractor must submit a new permit for each extra shift.

.5 During the work inside the confined space, the gas concentration must be measured continuously and the gas detector must be installed at breathing area of the workers. If the conditions inside the confined space are such that the workers might not hear/see the detector's alarm, the Contractor must find a way for the confined space safety watcher to watch the concentration measures while maintaining the measurements at the level of the breathing zone of the workers.

.6 If the work is organized in a way that the workers are scattered far away from each other in a large confined space, the Contractor needs to provide additional gas detectors.

.7 The Contractor must provide the gas detectors and maintain them in good condition. He must be able to show that the gas detectors used have been calibrated and adjusted by the person in charge of the health and safety for the work in confined spaces or by a qualified person, in accordance with the manufacturer's recommendations. The Departmental Representative can at all times have the accuracy of the measuring devices checked. In the event of the failure of a detection device, the work must be stopped immediately and all workers must leave the confined space.

.8 The manufacturer's manual of the gas detectors must be available on the construction site.

.9 The Contractor shall provide a ventilation system to keep concentrations of contaminants below the regulatory limits.

.10 If work generating contaminants are performed (welding, use of products, etc.), the Contractor must, if needed, install an aspiration system for the contaminants so that the regulatory values of air quality can be maintained at all times.

.11 If a detecting device alarm goes off, all workers shall leave the confined space. The measured levels of concentration must then be recorded on the entry permit. The Contractor shall then find the source of contamination, neutralize it, ventilate the confined space to eliminate contaminant residues and authorize access to the confined space only when concentrations of oxygen and gas have returned to normal.

.12 Compressed gas cylinders or welding equipment shall not be brought into confined spaces: this equipment shall remain outside and shall not block entrances or exits; all cylinders shall be properly secured.

.13 Tools and electrical devices used to work in the confined spaces shall be grounded and, when necessary, designed to be explosion-proof. All equipment must be connected to a ground fault interrupter outlet or to a step-down transformer. The Contractor shall, at his own cost, hire a qualified electrician to adjust power receptacles and/or circuit breakers that he intends to use which do not meet these criteria.

.14 The Contractor shall obtain a Hot Work Permit and respect the requirements to that effect when the work to be carried out includes hot work.

.15 The Contractor must assign a competent person to assume the duties of confined space safety watcher. The supervisor shall be exclusively dedicated to these duties and must constantly remain outside of the confined space as long as there is a worker in it. He must also:

.1 Ensure that the entry permit has been filled, signed and posted near the confined space;

.2 Be familiar with the work procedure specific to the confined space and ensure that it is respected;

.3 Ensure continuous communication with all the workers in the confined space and ensure that all the equipement required in case of emergency is present;

.4 Have a good knowledge of the ventilation systems and ensure their proper functioning for the duration of the work;

.5 Prevent access to unauthorized persons;

.6 Ensure that the conditions around the confined space zone is not a health or security risk for the workers inside the confined space;

.7 Initiate the emergency procedure if needed.

.16 The same person may act as a confined space safety watcher and as the person in charge of the health and safety of the work in confined spaces, provided all requirements of both functions are met.

1.33 EXCAVATION WORK

.1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Contractor who performs the digging of trenches or excavations must respect the following requirements:

.2 Fill out the following form and submit it to the Departmental Representative before beginning to excavation work.

.3 Therefore submit to the Departmental Representative, as appropriate, the following documents:

.1 Plans and specifications, signed and sealed by an engineer, of the shoring needed to be installed for the excavation work; or

.2 Engineer’s advice specifying the wall angles of the trench or excavation.

CSST

Excavation guidelines

N° ____ of ____

This directive is provided as an example by the Commission de la santé et de la sécurité du travail (CSST). It contains the main instructions that the employer should give to the person responsible for the work on the site and to the operator of the earth-moving machine.

Company name	
Project name	Project no.
Address of the site	Construction start date

Field survey

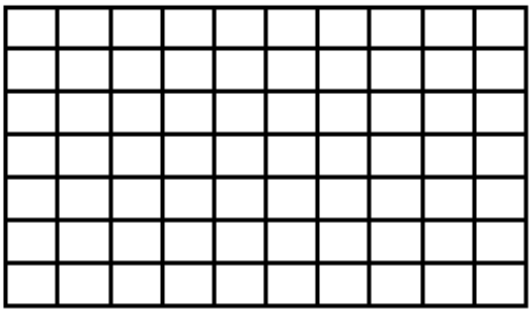
Chaining or axes : from _____ to _____ Attached plan ☐ Plan no. : _____

Working method to use

While making sure the excavation walls do not pose the risk of landslide

- ☐ dig and shore according to the plans and specifications of the engineer ;
- ☐ dig and shore using a trench box ;
- ☐ dig without shoring as long as one of the following conditions is respected:
  - ☐ rock is sound;
  - ☐ no worker goes down in the trench or excavation;
  - ☐ the walls are dug according to the engineer's advice.

Dimensions of excavation (Dig according to the following profile.)



	Minimum	Maximum
H Depth		
Wb Width at bottom Width at top		

Safety measures

Deposit the materials at a distance of at least 1.2 metre (4 feet) from top of walls.
Do not allowed any vehicle to come closer than 3 metres (10 feet) from top of walls.

- ☐ Respect the engineer's plan concerning work in the proximity of an existing facility.
- ☐ Follow the location plan to locate the underground infrastructures.
- ☐ Install signaling devices prescribed in the traffic plan (barriers, visual references, etc.).
- ☐ Assign a flag person or more to control the flow of traffic.
- ☐ Respect the procedure prescribes for work near power lines.
- ☐ Provide protection devices for the workers, such as concrete crash barriers.

Name	Occupation	
Signature	Date	Telephone no.

Directive submitted
☐ to the responsible of the work on the site ☐ to the operator of the earth-moving machine

DC700-6062 (2001-03)

1.34 LIFTING LOADS WITH CRANE OR BOOM TRUCK

.1 Unless specified otherwise, the Contractor must prepare a hoisting plan and submit it to the Departmental Representative for all lifting operations done with a crane or a boom truck at least 5 days before these lifting operations begin. The hoisting plan must contain at a minimum the information listed at the end of this article.

.2 The hoisting plan must be signed and sealed by an engineer for the following lifting operations:

- .1 Lifting of concrete panels;
- .2 Lifting mechanical/electrical equipment on a roof or on the floor of a building;
- .3 Lifting of loads encroaching on the public road;
- .4 Lifting large dimensions or very heavy loads;
- .5 All other lifting operation, in accordance with the requirements of the Departmental Representative.

.3 In addition to the above requirements, the Contractor must plan the hoisting operations in a way as to avoid that the loads pass over the occupied zones on the site. When there is no alternative, the hoisting plan must absolutely be signed and sealed by an engineer and must guarantee the security of the occupants in that zone; the plan must also be approved by the Departmental Representative. The Departmental Representative can, if he deems necessary, require that the work be done at night or on weekends.

.4 Upon the beginning of the work on the construction site, the Contractor must submit the list of the hoisting plans anticipated for the whole project to the Departmental Representative. That list shall be updated as needed if changes occur during the work.

.5 In addition to the mechanical service inspection certificate, the annual inspection certificate and the crane logbook must be aboard all cranes and boom truck cabs.

.6 The entire lifting area shall be marked off to prevent the entry of non-authorized persons.

.7 The Contractor shall carefully inspect all of the slings and lifting accessories and make sure that those in poor condition are destroyed and scrapped.

.8 Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.

.9 <u>Minimum content of hoisting plan</u>

- .1 Sketch indicating at a minimum, the location of the crane, the surrounding facilities, the zone covered by the hoisting operations, the pedestrian’s pathways and vehicular routes, the security perimeter, etc.
- .2 Weight of loads
- .3 Dimensions of loads
- .4 List of hoisting devices and weight of each
- .5 Total weight lifted
- .6 Maximum height of obstacles to clear
- .7 Height of loads lifting relative to the surface of the roof (in the case of loads to be placed on roofs)
- .8 Use of guide cables

.9 Type of crane used
.10 Crane capacity
.11 Boom length
.12 Boom angle
.13 Crane's radius of action
.14 Deployment of stabilizers
.15 Percentage usage of the crane's capacity
.16 Verification confirmation of hoisting equipment
.17 Identification of the crane operator and the person responsible for the hoisting operations with date and signatures.

1.35 HOT WORK

.1 Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning, heating, etc.

.1 Before the beginning of each shift of work and for each sector, the Contractor must obtain a "Hot Work Permit" emitted by the person responsible for the site.

.2 A working portable fire extinguisher suitable to the fire risk shall be available and easily accessible within a 5 m radius from any flame, spark source or intense heat.

.3 The Contractor must appoint an individual to do continuous monitoring of the fire risks for a period of one (1) hour after the end of the shift of hot work. This individual shall sign the section for this purpose on the permit and give it to the person in charge of the construction site after the one-hour period.

.4 When the hot work is done in areas where there is combustible materials or where the walls, ceilings or floors are made of or covered with combustible materials, a final inspection of the work area must be scheduled four (4) hours after the work has finished. Unless specified otherwise by the Departmental Representative, the Contractor must assign a person to carry out this monitoring.

.2 Welding and cutting: In addition to the requirements prescribed in the preceding paragraphs, the Contractor must respect the following requirements:

.1 Welding and cutting work must be carried out in accordance with the requirements of the *Code de Sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry) and CSA standard W117.2, Safety in Cutting, Welding and Allied Processes.

.2 Air extraction system with filters must be used for all welding and cutting work performed inside.

.3 Stop all activities producing flammable or combustible gas, vapours or dust in the vicinity of the welding or cutting work.

.4 Store all compressed gas cylinder on a fireproof fabric and make sure that the room is well ventilated.

.5 Store all oxygen cylinders more than 6 metres from a flammable gas cylinder (ex: acetylene) or a combustible such as oil or grease, unless the oxygen cylinder

is separated from it by a wall made of non-combustible material as mentioned in the article 3.13.4 of the *Code de sécurité pour les travaux de construction, S-2, r. 6* (Safety code for the construction industry)

.6 Store the cylinders far from all heat sources.

.7 Not to store the cylinders close to the staircases, exits, corridors and elevators.

.8 Do not put acetylene in contact with metals such as silver, mercury, copper and alloys of brass having more than 65% copper to avoid the risk of an explosive reaction.

.9 Check that welding equipment with electric arc has the necessary tension and are grounded.

.10 Ensure that the conducting wires of the electric welding equipment are not damaged.

.11 Place the welding equipment on a flat ground away from the bad weather.

.12 Install fireproof canvas when the welding work is done in a superposition and where there is the risk of falling sparks.

.13 Move away or protect the combustible materials which are closer than 15 metres from the welding work.

.14 Prohibition to weld or cut any closed container.

.15 Do not perform any cutting, welding or work with a naked flame on a container, a tank, a pipe or other container containing a flammable or explosive substance unless:

.1 they have been cleaned and air samples indicating that work can be done without danger has been taken; and

.2 provisions to ensure the safety of the workers have been made.

1.36 ROOFING WORK

.1 Protection against fall from heights

.1 Installation of guardrails is mandatory at all times; however, the installation of a warning line is allowed to define the limits of the work zones provided that all the requirements of the articles 2.9.4.0 and 2.9.4.1 of the *Code de sécurité pour les travaux de construction* (Safety code for the Construction Industry) are respected.

.2 The guardrails must remain in place until the end of the project. The Departmental Representative will authorize their dismantling when he can confirm that all the work, inspections and corrections have been made.

.3 Workers installing guardrails must wear safety harnesses.

.4 Workers installing and modifying guardrails or flashing shall wear safety harnesses in the event guardrails must be moved temporarily.

.5 Workers shall wear safety harnesses when receiving material and giving directions to the crane operator next to a drop.

.6 Safety harnesses shall be worn when carrying out work next to a drop where collective protection is not sufficiently safe.

.7 The Contractor shall provide a fastening method and safety cable system compliant with section 2.10.12 of the *Code de sécurité pour les travaux de construction (L.R.Q., S-2.1, r.4)* (Safety code for the Construction Industry) for each construction site or location.

.2 Lifting of materials

.1 For all winch installations, the Contractor shall provide the Departmental Representative with the installation method recommended by the manufacturer. If unavailable, the Contractor shall then provide an installation procedure signed and sealed by an engineer. The installation procedure must take into account load-bearing capacity, the amount, weight and location of counterweight and any other detail that may affect the capacity and stability of the device.

.2 The Contractor shall carefully inspect all of the slings and lifting accessories and make sure that those in poor condition are destroyed or scrapped.

.3 Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.

.4 In all cases where a crane or boom truck is used, the Contractor must respect the requirements of the paragraph Lifting Loads With Crane or Boom Truck, in this section.

.3 Protection against burns

.1 Individuals assigned to the boilers shall wear long sleeves, safety glasses and a face shield when filling the boilers.

.2 Individuals working with asphalt or other hot liquids shall wear gloves, long sleeves and safety glasses.

.4 Protection against fire

.1 The storage and use of propane cylinders shall comply with the standard CAN/CSA-B149.2, *Propane Storage and Handling Code*. The cylinders shall be stored outdoors, in a safe place, away from any unauthorized handling, in a storage cabinet specially designed for this purpose. The cylinders shall be securely kept upright and locked at all times in a place where no vehicles are allowed unless the cylinders are protected by barriers or similar protection.

.2 The number of propane cylinders on the roof shall not exceed the number of cylinders necessary for a day's work, and cylinders shall at all times be secured upright or held in a cart designed for this purpose.

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

.5 Material and waste management

.1 On the roof, light material and sheet material shall be kept in containers or be securely fastened. In the event this requirement is disregarded in the slightest way, the Departmental Representative may disallow the storage of materials on the roof.

.2 Waste shall be discarded as produced using a waste chute or appropriate containers. The Contractor shall provide the means to prevent waste from being carried away by the wind.

.3 All waste must be removed from the roof at the end of shifts.

.4 Unless otherwise authorized by the Departmental Representative, all waste bins must be placed at least 3 m from any structure or building.

.6 Protection of occupants and the public

.1 Contractor must install covered passageways, nets or other devices above the entrances and the exits of the building to protect the workers, the public and the occupants against falling object. The means of protection must be approved by the Departmental Representative.

.2 A safety perimeter on the ground must be placed under the work zone in order to protect the workers, the public and the occupants.

.3 The ground construction site, material handling area and boiler area shall be clearly sealed off to prevent occupants or the public from accessing the construction site and areas.

.4 Before installing any device that may emit gas or fumes, the Contractor shall receive authorization from the person in charge of the construction site, who shall make sure that there is no risk of gas or fumes infiltrating the building's ventilation system.

1.37 STEEL STRUCTURE ERECTION OR DISMANTLING WORK

.1 In addition to respecting section 3.24 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.

.2 Contractor must submit the following documents to the Departmental Representative before the beginning of steel structure erection work:

.1 Erecting procedures in accordance with article 3.24.10 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry);

.2 Rescue procedures for the release of a worker suspended in a safety harness within a maximum of 15 minutes; procedures must be adapted to the construction site and in accordance with article 3.24.4 of that same code; the procedure must be accompanied by a written confirmation that it has been tested;

.3 Statement from an engineer that the anchor rods have been installed in accordance with the anchoring plan as required by the article 3.24.12 of that same code;

.4 Hoisting procedures in cases where the lifting is done in one of the ways described in the article 3.24.15 of that same code;

.5 Name of the individual identified as rescuer and his rescue training certificate;

.6 Name of the individual identified as first-aid attendant and his first-aid training certificate.

.3 The Contractor must make sure that the following documents are available for consultation on construction site at all times:

.1 Steel structure manufacturer's erection plan in accordance with the requirements of article 3.24.9 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry);

.2 Column anchor rod's anchoring plan in accordance with the requirements of article 3.24.11 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry).

1.38 WORK NEAR BODIES OF WATER

.1 Not applicable.

1.39 INTERIOR USE OF INTERNAL COMBUSTION ENGINES

.1 In addition to respecting article 3.10.17 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.

.2 The use of a gas-powered equipment inside a building is prohibited even if the building is provided with openings.

.3 The use of other equipment powered by an internal combustion engine inside a building must be submitted to the approval of the Departmental Representative.

.4 For the use of any piece of equipment powered by an internal combustion engine inside a building, even if the building is provided with openings, the Contractor must install a ventilation system able to maintain the concentrations of toxic gases below the regulatory values. The stale air shall be exhausted outside the building.

.1 Before using equipment powered by an internal combustion engine, the Contractor must plan and write the following:

a) Number of fans to install;

b) Power of the fans;

c) Location of the fans;

d) Dimensions of the openings that will be open during the work.

.5 During the operation of equipment with internal combustion engine, the Contractor must measure the concentrations of carbon monoxide and nitrogen oxides in the work area and at the breathing area of the workers; the concentration levels measured must be recorded in a register every 30 minutes that must be available for consultation.

.6 If work is in an occupied building, the Contractor must also measure the concentrations of carbon monoxide and nitrogen oxides in the rooms next to the work area and the concentration levels measured must be recorded in a register every 30 minutes.

.7 If the carbon monoxide or nitrogen oxides detector alarm goes off during the work, the Contractor must stop the work and take the corrective measures required before resuming the work.

.8 A portable fire extinguisher must be available at all times in the work area during the use of equipment with internal combustion engines.

.9 The equipment must be maintained at a safe distance from all combustible material.

.10 The storage of fuel for any equipment with internal combustion engine is prohibited inside a building.

1.40 TEMPORARY HEATING

.1 In addition to respecting section 3.11 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.

.2 A portable fire extinguisher must be available at all times near the heating units, no matter what type of heating is used.

.3 The heating units must always be used in accordance with the manufacturer's specifications.

.4 If applicable, the canvas or tarpaulins used next to the heating units must be solidly fixed so as not to be projected on the heaters, on the pipes connected to the heaters or on any other heat source.

.5 The gas cylinders must be installed in a way that they are protected from vehicule and other equipment traffic.

.6 For the use of heating units other than electric, the Contractor must install a carbon monoxide detector in the work area, next to the heating units and/or the workers, throughout the course of the heating period. The Contractor must immediately apply the corrective measures required to the heating units if the detector's alarm goes off.

.7 The Contractor must ensure a minimum surveillance of the heating units outside the hours of work (nights and weekends). He must submit a surveillance plan to the Departmental Representative before the use of the heating units.

1.41 WORK NEAR OVERHEAD POWER LINES

.1 When there is an overhead power line in the work zone and that the Contractor chooses to apply paragraph b) of article 5.2.2 of the *Code de sécurité pour les travaux de construction* (2.1, r.4) (Safety code for the Construction Industry), a copy of the agreement with the electrical power company and a copy of the work process, required in the article 5.2.2 b), must be submitted to the Departmental Representative before the beginning of the work in relation to these documents.

1.42 DIVING OPERATIONS

.1 Not applicable.

1.43 HEALTH AND SAFETY SUBORDINATION AGREEMENT

.1 Agreement to fill out next page; a completed and signed copy to be submitted to the Departmental Representative.

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)

_____, which is the Principal Contractor for the project indicated above during the entire duration of our work on the construction site. Accordingly, I confirm that I have reviewed the Principal Contractor's prevention program, and I agree to:

- Inform my employees of the content of the Principal Contractor's prevention program and ensure that its content are complied with at all times;
- Apply the prevention 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 construction site and obtain the Principal Contractor's agreement before the start of work; and
- Follow the health and safety directives provided by the representative of the Principal Contractor on the construction site and, depending on requirements, attend training sessions and health and safety meetings organized by the representative of the Principal Contractor.

Name of Representative:	Name of Business:
Description of work to be done on the construction site:	
Approximate dates of work (start-end): Start:	End:

_____ _____
Signature Date

PRINCIPAL CONTRACTOR

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

Name of Representative:	Name of Principal Contractor's business:

Signature : _____ Date : _____

Submit a completed and signed copy to Departmental Representative

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-in-place concrete

.2 Section 06 08 99 - Rough carpentry for minor works

.3 Section 09 91 99 - Painting for minor works

1.2 REFERENCE STANDARDS

.1 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

.2 EPA General Construction Permit (GCP) 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for toxics products.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements, 01 35 43- Environmental Procedures.

.3 Sustainable Design Submittals:

.4 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.5 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.6 Address topics at level of detail commensurate with environmental issue and required construction task[s].

.7 Include in Environmental Protection Plan:

.1 Name[s]of person[s]responsible for ensuring adherence to Environmental Protection Plan.

.2 Name[s]and qualifications of person[s]responsible for manifesting hazardous waste to be removed from site.

.3 Name[s]and qualifications of person[s]responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations and EPA 832/R-92-005, Chapter 3.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.15 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

.1 Fires and burning of rubbish on site is not permitted

.2 Where fires or burning is permitted, prevent staining or smoke damage to structures, materials or vegetation which is to be preserved.

.1 Restore, clean and return to new condition stained or damaged work.

.3 Provide supervision, attendance and fire protection measures as directed.

1.5 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and

sediment control plan, Federal, Provincial, and Municipal laws and regulations[US EPA General Construction Permit] [, EPA 832/R-92-005, Chapter 3].

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of [2]m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated designated by Departmental Representative.

1.7 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Use waterway beds for borrow material only after written receipt of approval from Departmental Representative.

.3 Waterways to be kept free of excavated fill, waste material and debris.

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

.7 Blasting is allowed only above water and 100 m minimum from indicated spawning beds.

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where indicated directed by Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

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

.2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative

.3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.5 Waste Management: separate waste materials for recycling, reuse in accordance with Section.

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

END OF SECTION

1 GENERAL

1.01 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.02 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.03 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.04 PROCEDURES

.1 Notify appropriate Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.05 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.06 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being inspected or tested.

1.07 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.08 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.09 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical systems.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ACTION AND INFORMATIONAL SUBMITTALS

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

1.02 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.03 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.04 WATER SUPPLY

.1 Arrange for water supply for the needs of the works with appropriate utility company and pay costs.

1.05 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:
- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.5 Ventilating:
- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Permanent heating system of building, to be used when available. Be responsible for damage to heating system if use is permitted.

.7 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Departmental Representative.

.8 Pay costs for maintaining temporary heat, when using permanent heating system.

.9 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct-fired combustion units to outside.

.10 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.06 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used.

1.07 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary communications services necessary for own use and use of Departmental Representative.

1.08 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.
- .2 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
- .1 CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-0121-[M1978(R2003)], Douglas Fir Plywood.
- .3 CAN/CSA-S269.2-[M1987(R2003)], Access Scaffolding for Construction Purposes.
- .4 CAN/CSA-Z321-[96(R2001)], Signs and Symbols for the Occupational Environment.

.3 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

1.03 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such work after use.

1.04 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ladders, platforms, temporary stairs..

1.05 HOISTING

.1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists to be operated by qualified operator.

1.06 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.07 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work and the operations of the airport.

.2 Clean taxi areas where used by Contractor's equipment.

1.08 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Departmental Representative's office.

- .1 Provide a trailer for Departmental Representative.
- .2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, complete with two 50% opening windows and one lockable door.
- .3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.
- .4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
- .5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures.
- .6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.
- .7 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
- .8 Maintain in clean condition.

1.09 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.10 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.

.2 Construction sign 1 210 x 2 420 mm, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 Indicate on sign, name of Owner, Consultant and Contractor of design style established by Departmental Representative.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.

.6 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.7 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.12 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)
- .1 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.
- .2 CAN/CGSB 1.189-[00], Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)
- .1 CSA-O121-[M1978(R2003)], Douglas Fir Plywood.

.3 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

.4 Bureau de la normalisation du Québec (BNQ)
- .1 BNQ 3910 - 700. Temporary Canvas Winter Shelters for Motor Vehicles

1.02 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.03 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades.

.2 Provide as required by governing authorities.

1.04 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and severe weather..

1.05 DUST TIGHT SCREENS

.1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.06 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.07 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.08 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection.

1.09 WASTE MANAGEMENT AND DISPOSAL

.1 Remove waste and surplus materials in accordance with local bylaws.

1.10 TEMPORARY SHELTER AGAINST HARSH WEATHER

.1 The temporary shelter to supply must have a free height of 4 260 mm, a width of 6 100 mm and a length of 23 000mm.

.2 The shelter must support the wind and snow loads of Kuujjuaq.

1.11 TEMPORARY SHELTER INSTALLATION

.1 Supply and install the temporary shelter as soon as possible to allow for the work to proceed. The shelter must be certified conforming to the requirements of the standard BNQ 3910-600.

.2 The anchoring method must be designed by an engineer and an installation drawing sealed by an engineer registered in Quebec submitted for review.

.2 Coordinate the location of its installation with the airport authorities.

.3 Dismantle the shelter and remove from the site at the end of the works.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards in each section of the specifications.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.02 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

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

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.03 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.04 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

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

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

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

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

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

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative].

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.05 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.06 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.07 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.08 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

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

1.09 CONCEALMENT

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

.2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.10 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.12 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.15 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:
- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:
- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.02 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.03 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.04 EXECUTION

.1 Execute cutting, fitting, and patching [including excavation and fill,] to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work [airtight] to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with [firestopping] material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Provide on-site containers for collection of waste materials and debris.

.4 Dispose of waste materials and debris off site.

.5 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.02 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

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

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.6 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.

.7 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.

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

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

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

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

.12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.13 Remove dirt and other disfiguration from exterior surfaces.

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

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

Part 1 GENERAL

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.

.2 PWGSC's Waste Management Goal is to reduce the total Project Waste to be diverted from landfill sites. Provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.

.3 Accomplish maximum control of solid construction waste.

.4 Preserve environment and prevent pollution and environment damage.

1.2 RELATED REQUIREMENTS

.1 Not used.

1.3 DEFINITIONS

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

.2 Cost/Revenue Analysis Workplan (CRAW): based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.

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

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

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

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

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

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

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

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

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

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

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

.12 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

.13 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.14 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related required submittal and reporting requirements.

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

1.4 DOCUMENTS

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

.1 Construction demolition waste management and disposal plan.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit non-hazardous waste management and disposal plan identifying methods and sites for disposal of solid waste and clearing debris according to Section 01 74 21 –. Management and disposal of construction / demolition waste

1.6 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

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

.3 Keep records of construction waste including:

.1 Number and size of bins;

.2 Waste type of each bin;

.3 Total tonnage generated.

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

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

.6 Dispose waste at an authorized site.

1.7 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

1.8 SCHEDULING

.1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 PRODUCTS

2.1 NOT USED

.1 Not used.

Part 3 EXECUTION

3.1 APPLICATION

.1 Execute work in compliance with plans and specifications and the waste disposal and management plan.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

3.3 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Ministère de l'Environnement et de la Faune, siège social 150, boul. René-Lévesque Est, Québec (Québec) G1R 3P4.

END OF SECTION

1 GENERAL

1.01 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:
- .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  - .2 Request Departmental Representative's inspection.
- .2 Departmental Representative's Inspection:
  - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
  - .2 Contractor to correct Work as directed.
- .3 Completion Tasks: submit written certificates in English and French that tasks have been performed as follows:
  - .1 Work: completed and inspected for compliance with Contract Documents.
  - .2 Defects: corrected and deficiencies completed.
  - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
  - .4 Certificates required by Fire Commissioner: submitted.
  - .5 Operation of systems: demonstrated to Owner's personnel.
  - .6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements] and one copy of final Commissioning Report submitted to Departmental Representative.
  - .7 Work: complete and ready for final inspection.
- .4 Final Inspection:
  - .1 When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.
  - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment:
  - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
  - .2 When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

1.02 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English and French.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.02 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.
.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.
.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dwg format on CD.

1.03 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;
.1 Date of submission; names.
.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data

applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.
.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section [01 45 00 - Quality Control].

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.04 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, [in addition to requirements in General Conditions,] [at site for [Departmental Representative] [DCC Representative] [Consultant] [Owner]] one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.
.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.
.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.05 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of opaque drawings, and in copy of Project Manual.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.
.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.

.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 Referenced Standards to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

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

.7 Provide digital photos, if requested, for site records.

1.6 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.
.1 Give function, normal operation characteristics and limiting conditions.
.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
.1 Include regulation, control, stopping, shut-down, and emergency instructions.
.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports.

.15 Additional requirements: as specified in individual specification sections.

1.7 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
- .1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.8 MAINTENANCE MATERIALS

.1 Spare Parts:
- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to [site] [location as directed]; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:
- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to [site] [location as directed]; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to [Departmental Representative] [DCC Representative] [Consultant].
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:
- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to [site] [location as directed]; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or

deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.10 WARRANTIES AND BONDS

.1 Not used

1.11 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:
- .1 Type of product/material.
- .2 Model number.
- .3 Serial number.
- .4 Contract number.
- .5 Warranty period.
- .6 Inspector's signature.
- .7 Construction Contractor.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Division 15 – Mechanical Works

.2 Division 16 – Electrical Works

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.

.2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation:
- .1 Verify conditions for demonstration and instructions comply with requirements.
- .2 Verify designated personnel are present.
- .3 Ensure equipment has been inspected and put into operation.
- .4 Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.

.4 Demonstration and Instructions:
- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 91 31 – Commissioning (CX) Plan

.2 Section 01 91 33 – Commissioning Forms

.3 Section 01 91 41 – Commissioning Training

.4 Section 01 91 51 – Building management manual (BMM)

1.2 ACRONYMS

.1 AFD - Alternate Forms of Delivery, service provider.

.2 BMM - Building Management Manual.

.3 Cx - Commissioning.

.4 EMCS - Energy Monitoring and Control Systems.

.5 O&M - Operation and Maintenance.

.6 PI - Product Information.

.7 PV - Performance Verification.

.8 TAB - Testing, Adjusting and Balancing.

1.3 GENERAL

.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

.1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.

.2 Ensure appropriate documentation is compiled into the BMM.

.3 Effectively train O&M staff.

.2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.

.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

.4 AFD managed projects the term Departmental Representative in Cx specifications to be interpreted as AFD Service Provider.

1.4 COMMISSIONING OVERVIEW

.1 Section 01 91 31- Commissioning (Cx) Plan.

.2 For Cx responsibilities refer to Section 01 91 31- Commissioning (Cx) Plan.

.3 Cx to be a line item of Contractor's cost breakdown.

.4 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built [facility]is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.

.6 Departmental Representative will issue Interim Acceptance Certificate when:

.1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.

.2 Equipment, components and systems have been commissioned.

.3 O&M training has been completed.

1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.6 PRE-CX REVIEW

.1 Before Construction:

.1 Review Contract Documents, confirm by writing to Departmental Representative.

.1 Adequacy of provisions for Cx.

.2 Aspects of design and installation pertinent to success of Cx.

.2 Before start of Cx:

.1 Have completed Cx Plan up-to-date.

.2 Ensure installation of related components, equipment, sub-systems, systems is complete.

.3 Fully understand Cx requirements and procedures.

.4 Have Cx documentation shelf-ready.

.5 Understand completely design criteria and intent and special features.

.6 Submit complete start-up documentation to Departmental Representative.

.7 Have Cx schedules up-to-date.

.8 Ensure systems have been cleaned thoroughly.

.9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative]for review and approval.

.10 Ensure "As-Built" system schematics are available.

.3 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.7 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Submit no later than 6 weeks after award of Contract:

.1 Name of Contractor's Cx agent.

.2 Draft Cx documentation.

.3 Preliminary Cx schedule.

.2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.

.3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.

.4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.9 COMMISSIONING DOCUMENTATION

.1 Refer to Section 01 91 33- Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.

.2 Departmental Representative to review and approve Cx documentation.

.3 Provide completed and approved Cx documentation to Departmental Representative.

1.10 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule.

.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:

.1 Approval of Cx reports.

.2 Verification of reported results.

.3 Repairs, retesting, re-commissioning, re-verification.

.4 Training.

1.11 STARTING AND TESTING

.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.12 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

.3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

.2 Conduct start-up and testing in following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Start-up: follow accepted start-up procedures.

.3 Operational testing: document equipment performance.

.4 System PV: include repetition of tests after correcting deficiencies.

.5 Post-substantial performance verification: to include fine-tuning.

.3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document require tests on approved PV forms.

1.14 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.

.2 Start-up documentation to include:

.1 Start-up reports.

1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer develop written maintenance program and submit Departmental Representative for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.16 TEST RESULTS

.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.17 START OF COMMISSIONING

.1 Notify Departmental Representative at least 21 days prior to start of Cx.

.2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.18 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.19 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.

.2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified.

1.20 COMPLETION OF COMMISSIONING

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.21 TRAINING

.1 In accordance with Section 01 91 41- Commissioning (Cx) - Training.

1.22 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 91 13 – General commissioning (CX) Requirements

.2 Section 01 91 33 – Commissioning Form

.3 Section 01 91 41 – Commissioning Training

.4 Section 01 91 51 – Building management manual (BMM)

1.2 REFERENCE STANDARDS

.1 American Water Works Association (AWWA)

.2 Public Works and Government Services Canada (PSPC)

.1 PSPC - Commissioning Guidelines CP.4 -3rd edition-[03].

.3 Underwriters' Laboratories of Canada (ULC)

1.3 GENERAL

.1 Provide a fully functional facility:

.1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.

.2 Facility user and personnel have been fully trained in aspects of installed systems.

.3 Optimized life cycle costs.

.4 Complete documentation relating to installed equipment and systems.

.2 Term "Cx" in this section means "Commissioning".

.3 Use this Cx Plan as master planning document for Cx:

.1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.

.2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.

.3 Sets out deliverables relating to O&M, process and administration of Cx.

.4 Produces a complete functional system prior to issuance of Certificate of Occupancy.

.5 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:

.1 Overview of Cx.

.2 General description of elements that make up Cx Plan.

.3 Process and methodology for successful Cx.

.4 Acronyms:

.1 Cx - Commissioning.
.2 BMM - Building Management Manual.
.3 EMCS - Energy Monitoring and Control Systems.
.4 MSDS - Material Safety Data Sheets.
.5 PI - Product Information.
.6 PV - Performance Verification.
.7 TAB - Testing, Adjusting and Balancing.
.8 WHMIS - Workplace Hazardous Materials Information System.

.5 Commissioning terms used in this Section:

.1 Bumping: short term start-up to prove ability to start and prove correct rotation.
.2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.4 DEVELOPMENT OF 100% CX PLAN

.1 Cx Plan to be 95% completed before added into Project Specifications.

.2 Cx Plan to be 100% completed within [8]weeks of award of contract to take into account:

.1 Approved shop drawings and product data.
.2 Cx schedule.

1.5 REFINEMENT OF CX PLAN

.1 During construction phase, revise, refine and update Cx Plan to include:

.1 Changes resulting from Client program modifications.
.2 Approved design and construction changes.

.2 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

.1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.

.2 Project Manager will select Cx Team consisting of following members:

.1 PSPC Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
.2 PSPC Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:

.1 Review of Cx documentation from operational perspective.
.2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.

.3 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with Contract Documents, including:

.1 Testing.

.2 TAB.

.3 Performance of Cx activities.

.4 Delivery of training and Cx documentation.

.5 Assigning one person as point of contact with Consultant and PSPC Cx Manager for administrative and coordination purposes.

1.7 CX PARTICIPANTS

.1 Employ the following Cx participants to verify performance of equipment and systems:

.1 Installation contractor/subcontractor:

.1 Equipment and systems except as noted.

1.8 EXTENT OF CX

.1 Cx Structural and Architectural Systems:

.1 Architectural and structural:

.2 Commission mechanical systems and associated equipment:

.1 Plumbing systems:

.1 Domestic CWS and HWS.

.2 Regular sanitary waste systems.

.2 HVAC and exhaust systems:

.1 HVAC systems

.2 General exhaust systems

.3 Exhaust systems and related systems

.3 Commission electrical systems and equipment:

.1 Low voltage below 750 V:

.1 Low voltage equipment.

.2 Low voltage distribution systems.

.3 Central clock systems.

.2 Emergency power generation systems:

.1 Generators.

.2 Fuel systems.

.3 Lighting systems:

.1 Lighting equipment.

.2 Distribution systems.

1.9 DELIVERABLES RELATING TO O&M PERSPECTIVES

.1 General requirements:

.1 Compile English and French documentation.

.2 Documentation to be computer-compatible format ready for inputting for data management.

.2 Provide deliverables:

.1 Warranties.

.2 Inventory of spare parts, special tools and maintenance materials.

.3 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.10 DELIVERABLES RELATING TO THE CX PROCESS

.1 General:

.1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.

.2 Definitions:

.1 Cx as used in this section includes:

.1 Cx of components, equipment, systems, subsystems, and integrated systems.

.2 Factory inspections and performance verification tests.

.3 Deliverables: provide:

.1 Results of Performance Verification Tests and Inspections.

.2 Description of Cx activities and documentation.

.3 Tests of following witnessed by PSPC Design Quality Review Team:

.4 Training Plans.

.5 Cx Reports.

.6 Prescribed activities during warranty period.

.4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.

1.11 START-UP

.1 Start-up components, equipment and systems.

1.12 INSTALLATION CHECK LISTS (ICL)

.1 Refer to Section 01 91 33- Commissioning (Cx) Forms: Installation Check Lists.

1.13 CX SCHEDULES

.1 Prepare detailed Cx Schedule and submit toDepartmental Representative for review and approval same time as project Construction Schedule. Include:

.1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:

.1 Cx procedures: [3]months after award of contract.

.2 Cx Report format: [3]months after contract award.

.3 Notification of intention to start TAB: [21]days before start of TAB.

.4 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.

.5 Notification of intention to start Cx: [14]days before start of Cx.

.6 Implementation of training plans.

.7 Cx reports: immediately upon successful completion of Cx.

.2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to [Property Manager].

.2 After approval, incorporate Cx Schedule into Construction Schedule.

.3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

1.14 CX REPORTS

.1 Submit reports of tests, witnessed and certified by Departmental Representative to Departmental Representative who will verify reported results.

.2 Include completed and certified PV reports in properly formatted Cx Reports.

.3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

1.15 PRELIMINARY AND FINAL CX

.1 Not used

1.16 TESTS TO BE PERFORMED BY OWNER/USER

.1 Not used.

1.17 TRAINING PLANS

.1 Refer to Section 01 91 41- Commissioning (Cx) - Training.

1.18 FINAL SETTINGS

.1 Upon completion of Cx to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

1.19 PAYMENTS FOR CX

.1 Not used

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 91 13 – General commissioning (CX) Requirements

.2 Section 01 91 31 – Commissioning (CX) Plan

.3 Section 01 91 41 – Commissioning Training

.4 Section 01 91 51 – Building management manual (BMM)

1.2 INSTALLATION/START-UP CHECK LISTS

.1 Include the following data:

.1 Product manufacturer's installation instructions and recommended checks.

.2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.

1.3 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

.1 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.

.2 Confirm operation as per design criteria and intent.

.3 Identify variances between design and operation and reasons for variances.

.4 Verify operation in specified normal and emergency modes and under specified load conditions.

.5 Record analytical and substantiating data.

.6 Verify reported results.

.7 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.

.8 Submit immediately after tests are performed.

.9 Reported results in true measured SI unit values.

.10 Provide Departmental Representative with originals of completed forms.

.11 Maintain copy on site during start-up, testing and commissioning period.

.12 Forms to be both hard copy and electronic format with typed written results in Building Management Manual in accordance with Section 01 91 51- Building Management Manual (BMM).

1.4 LANGUAGE

.1 To suit the language profile of the awarded contract.

PART 2. PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3. EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 91 13 – General commissioning (CX) Requirements

.2 Section 01 91 31 – Commissioning (CX) Plan

.3 Section 01 91 33 – Commissioning Forms

.4 Section 01 91 51 – Building management manual (BMM)

1.2 TRAINEES

.1 Trainees: personnel selected for operating and maintaining this facility. Includes Property Manager, building operators, maintenance staff, security staff, and technical specialists as required.

.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

.1 Departmental Representative will provide:

.1 Descriptions of systems.

.2 Instruction on design philosophy, design criteria, and design intent.

.2 Contractor to provide instruction on:

.1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

.1 Training to be detailed and duration to ensure:

.1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.

.2 Effective on-going inspection, measurements of system performance.

.3 Proper preventive maintenance, diagnosis and trouble-shooting.

.4 Ability to update documentation.

.5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

.1 Instructors to be responsible for content and quality.

.2 Training materials to include:

.1 "As-Built" Contract Documents.

.2 Operating Manual.

.3 Maintenance Manual.

.4 Management Manual.

.5 TAB and PV Reports.

.3 Project Manager, Commissioning Manager and Property Manager will review training manuals.

.4 Training materials to be in a format that permits future training procedures to same degree of detail.

.5 Supplement training materials:

.1 Multimedia presentations.

.2 Equipment models.

1.6 SCHEDULING

.1 Include in Commissioning Schedule time for training.

.2 Deliver training during regular working hours, training sessions to be 2 hours in length.

.3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

.1 Be responsible for:

.1 Implementation of training activities,

.2 Coordination among instructors,

.3 Quality of training, training materials,

.2 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.8 TRAINING CONTENT

.1 Training to include demonstrations by Instructors using the installed equipment and systems.

.2 Content includes:

.1 Review of facility and occupancy profile.

.2 Review of system layout, equipment, components and controls.

.3 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.

.4 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.

.5 Maintenance and servicing.

.6 Trouble-shooting diagnosis.

.7 Inter-Action among systems during integrated operation.

.8 Review of O&M documentation.

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 91 13 – General commissioning (CX) Requirements

.2 Section 01 91 31 – Commissioning (CX) Plan

.3 Section 01 91 33 – Commissioning Forms

.4 Section 01 91 41 – Commissioning Training

1.2 ACRONYMS:

.1 BMM - Building Management Manual.

.2 Cx - Commissioning.

.3 HVAC - Heating, Ventilation and Air Conditioning.

.4 PI - Product Information.

.5 PV - Performance Verification.

.6 TAB - Testing, Adjusting and Balancing.

.7 WHMIS - Workplace Hazardous Materials Information System.

1.3 GENERAL REQUIREMENTS

.1 Standard letter size paper 216mm x 279mm.

.2 Methodology used to facilitate updating.

.3 Drawings, diagrams and schematics to be professionally developed.

.4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

1.4 APPROVALS

.1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Departmental Representative.

1.5 GENERAL INFORMATION

.1 Provide Departmental Representative the following for insertion into appropriate Part and Section of BMM:

.1 Complete list of names, addresses, telephone and e-mail of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of BMM.

.2 Summary of architectural, structural, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.

.1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.

.3 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of BMM.

.4 Operating and maintenance manual - Section 3.2 of BMM.

.5 Final commissioning plan as actually implemented.

.6 Completed commissioning checklists.

.7 Commissioning test procedures employed.

.8 Commissioning reports.

1.6 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

.1 Departmental Representative to review and approve format and organization within 8 weeks of award of contract.

.2 Include original manufactures brochures and written information on products and equipment installed on this project.

.3 Record and organize for easy access and retrieval of information contained in BMM.

.4 Inventory directory relating to information on installed systems, equipment and components.

.5 Approved project shop-drawings, product and maintenance data.

.6 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O&amp M, shutdown and training materials.

.7 Inventory and location of spare parts, special tools and maintenance materials.

.8 Warranty information.

.9 Maintenance program supporting information including:

.1 Recommended maintenance procedures and schedule.

.2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

1.7 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

.1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:

.1 General:

.1 Finalized commissioning plan.

.2 WHMIS information manual.

.3 Approved "as-built" drawings and specifications.

.4 Procedures used during commissioning.

.2 Mechanical:

.1 Installation permits, inspection certificates.

.2 Piping pressure test certificates.

.3 Ducting leakage test reports.

.4 TAB and PV reports.

.5 Charts of valves and steam traps.

.3 Electrical:

.1 Installation permits, inspection certificates.
.2 TAB and PV reports.
.3 Electrical work log book.
.4 Charts and schedules.
.5 Locations of cables and components.

1.8 LANGUAGE

.1 English and French Language to be in separate binders.

1.9 IDENTIFICATION OF FACILITY

.1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:

1.10 USE OF CURRENT TECHNOLOGY

.1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.

.2 Obtain Departmental Representative's approval before starting Work.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 CSA International
- .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Research Council Canada (NRC)
- .1 National Building Code of Canada [2015] (NBC).
- .2 National Fire Code of Canada [2015] (NFC).

1.03 SITE CONDITIONS

.1 Notify Departmental Representative before disrupting building access or services.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 EXAMINATION

.1 Inspect building with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
- .1 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.02 PREPARATION

.1 Protection of In-Place Conditions:
- .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep dust to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Demolition/Removal:
- .1 Remove items as indicated.
- .2 Remove parts of existing building to permit new construction.
- .3 Trim edges of partially demolished building elements to tolerances as defined by Departmental Representative to suit future use.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Refer to demolition drawings and specifications for items to be salvaged for reuse.

END OF SECTION

PART 1 GENERAL

1.1 DEFINITIONS

.1 The following definitions apply throughout this section of the quote

.1 Professional: consultant in structure or its representative on site during work execution

.2 Plans: unless otherwise annotated, drawings sealed and signed by the professional in structure and issued for execution of works.

1.2 RELATED SECTIONS

.1 Section 03 30 05 – Cast-in-place concrete

.2 Section 01 74 21 - Construction/demolition waste management and disposal

.3 General requirements apply to the work described in this section

1.3 REFERENCES

This quotation refers to the latest edition and revision of codes and standards.

.1 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.

.3 CSA O121, Douglas Fir Plywood.

.4 CSA O151, Canadian Softwood Plywood.

.5 CSA O153, Poplar Plywood.

.6 CAN/CSA-O325.0, Construction Sheathing.

.7 CSA O437, Standards for OSB and Waferboard.

.8 CSA S269.1, Falsework for Construction Purposes.

.9 CAN/CSA-S269.3, Concrete Formwork, National Standard of Canada

.10 Handbook SP 4 : «Formwork for Concrete», 4th edition, publish by the American Concrete Institute, P.O. Box 19150, Redford Station, Detroit, Michigan 48219, U.S.A.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.4 LINES AND LEVELS

.1 Place and secure on site all pin terminals required to erect formwork in strict compliance with the lines and levels shown on the plans.

The Contractor is solely responsible for the accuracy of these bench marks and must check them regularly and whenever the Professional deems necessary.

.2 Replace or immediately rectify any landmark terminal that has been removed or moved before the concrete work for which it is required have been completed and approved by the Professional.

1.5 SHORING OF FORMS

.1 Comply with each provision of Section VI of Safety Code for construction work, 2.1 S, r.6 published by Québec Official Publisher.

1.6 SHOP DRAWINGS

.1 For surfaces that remain exposed, submit to Professional for review the shop drawings of formwork. The orientation and size of plywood sheets, positions of form ties, sets of plates, and joints must be clearly indicated on the drawings. Exposed surfaces are shown on the architectural drawings and have the word 'exposed concrete'.

1.7 OPENINGS AND SLEEVES

.1 Provide and implement formwork required to achieve all the openings shown on the structural drawings and other specialties including mechanical, electrical and architecture, including all sleeves. Coordinate number, diameter and position of each opening and each sleeve with the other disciplines.

.2 Submit to Professional for approval, shop drawings clearly indicating the size, location and, if applicable, the elevation of each of the breakthroughs and cavities that are required in the concrete frame for the passing or burial of electrical and mechanical equipment of the building. These drawings must be prepared to be checked and approved by the mechanical and electrical consultant before being forwarded to the Professional.

.3 All costs incurred to comply with the requirements of sub-section .2 above must be assumed by the Contractor.

.4 The Contractor must not claim any extra in relation to openings shown on mechanical and electrical drawings but omitted on the structural drawings.

1.8 ACCESSORIES REQUIREMENTS

.1 Provide and implement all specified accessories on plans, even though such equipment may not be described in this section.

.2 The brand of each manufactured products described in this section must be approved by the Professional. If the Professional requests it, submit technical description and/or samples of the products as well as certified copies of test results and tests conducted by independent laboratories, certifying the compliance of the products with the standard specifications governing its manufacture.

1.9 NON STRUCTURAL ELEMENTS

.1 In all cases where fixations are not mentioned on plans but are required in the concrete frame of the building to support vertically and/or laterally architectural elements, mechanical equipment parts, electrical or other, the structural design and calculations of

these fasteners are entirely and exclusively the responsibility of the manufacturer who provides them, and does not commit in any way the professional responsibility of the Departmental Representative.

.2 Fixations referred in sub-section .1 above include plates, angles and all other direct contact hardware parts with concrete of the framework, including rods, bolts, studs and various anchoring devices entirely or partially embedded in the concrete.

.3 The Contractor must nevertheless submit to the Engineer for information two (2) copies of shop drawings clearly indicating the location of all required fasteners as well as the intensity and direction of the constraints that each fastener introduce into the concrete frame; These drawings must be beforehand "approved for construction" by an engineer active member of the Ordre des ingénieurs du Québec.

1.10 AUTHORIZATION OR APPROVAL OF PROFESSIONAL

.1 When required in accordance with the requirements of this section, the permission or approval of the Professional must not be regarded as having been obtained until it has been notified in writing or recorded in the minutes ratified by all persons attending meeting and where Professional was also attending.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Plywood, wood, steel, aluminum, etc. must comply with the specifications of the most recent editions of CSA standards for the manufacturing of those materials.

.2 For areas that remain exposed, use new or “new state” plywood, meaning that all corners and edges are intact and the surface should be smooth, with no unbounded surface lamellae.

Smooth (meaning): at the time of stripping, plywood should not leave knot or wood fiber fingerprints in concrete.

.3 Release oil: inert oil which does not stain the concrete and will not decrease the adhesion of coatings. Use vegetable oil that meets the requirements of laws and regulations relating to the environment. Submit specifications for consideration by the Professional.

.4 Form ties: use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.5 For exposed surfaces, form ties should not allow metal within 35 mm of the surface and leave a net hole made with a nylon cone or otherwise.

.6 Shoring: telescopic cylinders steel.

2.2 PRODUCTS ACCESSORIES

.1 Steel Embedded parts

.1 Steel embedded parts meet the requirements of CSA G40.21 standard, grade 300W.

.2 All embedded parts in concrete and exposed to outdoor conditions is hot dip galvanized in accordance with CAN / CSA-G164,

.2 Precasted trim joints

.1 Foam-cell polyvinyl chloride boards (with sealed pores) not subject to extrusion, rigid nuance and a trademark approved by the Professional.

.3 Putty caulking joints

.1 Polyurethane based sealing mastic that meets the specifications of ONGC CAN2-19-GP-16M.

.2 The sealant used to seal joints in floors must be self-leveling.

.4 Thermal Insulation

.1 For insulation boards shown in the drawings of concrete, extruded polystyrene and expanded meets the specifications of ONGC F41 GP 14a, type 4.

.5 Grout (for base plates)

.1 Expansive cement grout that meets the requirements of ASTM C107, Class A. Use a pre-dosed product bag with a minimum strength of 30 MPa at the age of 7 days.

Part 3 EXECUTION

3.1 ACCESSORIES

.1 Caulking joints

.1 Respect the dimensions given in the drawings and follow the manufacturer's recommendations.

.2 Thermal Insulation

.1 Install boards so that they are not subsequently subject to be bent or to be perforated.

.2 Replace with no charge to the client any board that, in the opinion of the Professional, was damaged to the point that its insulating properties are reduced.

.3 Join panels without leaving any gap and seal the joints with plastic moisture resistant tape.

.3 Waterproofing seals

.1 Even if there is no indication in the drawings, all vertical joints below ground level must be waterproofed with sealing blades.

.2 Take care not to deform or damage the sealing strips by placing them in the forms; avoid moving the adjacent rebar and ensure that the forms do not move or fold during concreting.

.3 Join sealing blades by hot welding, following the manufacturer's recommendations; each weld must be perfectly sealed. The abutment of the blades on the site is permitted only in the case of segments located in the extension of one another.

.4 Embedded parts

.1 All embedded parts manufacturing work must be performed in accordance with the requirements of CAN3-S16.1

.5 Adjustment of base plates for grouting (steel framing)

.1 Agree with the manufacturers of the superstructure of the dates on which the final adjustment of the base plates on columns and walls will be made.

.2 Measure out and implement the casting of grout according to manufacturer's directions. Ensure no vacuum is left on each plate.

3.2 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions correspond to drawings.

.2 Erect formwork according to the tolerances specified in section 6 of CAN / CSA A23.1.

.3 Minimize the number of joints in the formwork. No horizontal joint is allowed at a height of less than 3.2 meters above the floor in the forms of walls and columns, where the concrete must remain exposed.

.4 Align the inner walls of forms sides joints and make them fully waterproof.

.5 Bevel with triangular strips of 20 mm side edges of beams and columns, concrete must remain exposed unless otherwise indicated on the plans.

.6 Secure to framework all components required for molding grooves, reinforcements, mortises, drips, etc. in strict accordance with the details shown in the drawings, including architectural drawings.

.7 For areas marked on the structural or architectural drawings, where the concrete will remain apparent, position if required in the drawings, boards, sticks, etc., to obtain the specified texture.

.8 Unless otherwise specified on the structural or architectural drawings, form ties must be arranged in a regular module. Fill tie holes with gray plastic caps pale or dark gray depending on the appearance of the concrete, as approved by the Departmental Representative. The caps must be set back from the face of concrete.

.9 After forms stripping, seal the bottom of holes using caulking approved by the Professional. Exposed surface wood forms must be new or "new condition". Submit to Professional for review the shop drawings formwork.

.10 It must be prohibited, unless the Professional have given permission, to mold into the forms openings that are not shown on the drawings referred in Article 1.9.

3.3 SHORING OF FORMS

.1 Adjust the height of each of the required shoring under the forms to compensate for subsidence that may occur during the installation of the concrete and adjust forms as prescribed in sub-section .2 below.

.2 Determine the curvature required in the middle of the span of each element of the concrete floor of the building unless more specific indications are available on drawings.

.1 Beams and slabs where the main reinforcement is unidirectional: 2 mm per net meter of length.

.2 Slabs where the main reinforcement is bidirectional: 2 mm per meter along the diagonals joining the opposite edges of the quadrilateral formed by each panel.

.3 In the case of beams or slabs that are cantilever, unless the Professional specifies height, camber at the unsupported end of these elements must be 2 mm per net meter of length.

.3 Make sure that items of formwork with imposed curvature will not be shallower in thicknesses or depths than those indicated on the plans.

3.4 CONSTRUCTION JOINTS

.1 Vertical elements laid in the forms to delimit construction joints in the concrete frame must be stiff, straight and perfectly straight; they must also be perforated so that the reinforcement that crosses them may be placed at the specified height and spacing according to the plans.

.2 Set up the wood pieces to practice the key in the concrete.

3.5 ANCHOR BOLTS

.1 Position accurately and secure in the forms anchor bolts shown on the plans.

.2 Use wooden template to position the anchors according to the elements to be anchored. Fix the anchors to the template with a nut and a washer above and below the template.

.3 Coordinate delivery to the site of the anchor bolts with the supplier of those bolts.

3.6 ACCESSORY PARTS

.1 Place and secure in the forms in accordance with the details shown on the plans all accessory parts to be fully or partially embedded in the concrete.

.2 Place and also secure in the forms other accessory part to be embedded in the concrete frame that is shown on architectural drawings, mechanical or electrical expressly approved in this regard by the Professional.

.3 Coordinate the delivery to site and the installation of accessory parts with suppliers of these parts.

.4 It is prohibited to place in the forms accessory parts not stated on the plans or on the drawings referred to in Article .2 above, unless the Professional has given his authorisation.

3.7 REMOVAL OF FORMWORK

.1 Leave the formwork in place after placing concrete until the following periods have expired:

.1 Footings: 24 hours;

.2 Walls, columns and beams sides: 3 days;

.3 Slab and beam soffits: 28 days, or 3 days if reshoring is made immediately (within 30 minutes or less) and remains in place until the end the aforementioned period of 28 days.

.4 The period of time specified above represent a number of cumulative hours, days or fractions of days, not necessarily consecutive, during which the ambient temperature is maintained to at least 10 ° C.

.2 Notwithstanding the provisions of sub section .1 above, do not proceed to removal of formworks unless the Professional is satisfied, with the measures taken to ensure concrete cure and protection against cold or heat and weather, and has given permission.

.3 Professional can however cancel the provisions of sub-section .1 above if non-destructive testing of the concrete in place in the forms indicates that the concrete has reached the following percentages of resistance to the specified compression:

.1 Footings: 20%

.2 Walls: 40%

.3 Columns: 60%

.4 Beams and slabs: 80%

.4 Non-destructive testing mentioned above must have a recognized value and be approved by the Professional; it will determine beforehand where they are made. The costs of these tests must be assumed by the Contractor.

.5 Even when it was authorized by the Professional to proceed to removal of formwork and/or shore, the Contractor remains solely responsible for any damage to concrete framing members as a result of the premature execution of this work.

3.8 RESHORING

.1 Submit to Professional for approval a sketch indicating the number and the position of shoring to be held in place under framework of the floors after removal of formwork. This sketch must be sealed and signed by the Engineer referred in Article 1.6.2.

.2 No charge in addition to their own weight must solicit the backbone of concrete elements when they are reshored immediately after removal of formwork.

.3 The reshoring must be executed according to the requirements of Chapter 10 of Handbook SP 4 of the American Concrete Institute (see section 1.4).

END OF SECTION

Part 1 GENERAL

1.1 DEFINITIONS

.1 The following definitions apply throughout this section of the quote

.1 Professional: consultant in structure or its representative on site during work execution

.2 Plans: unless otherwise annotated, drawings sealed and signed by the professional in structure and issued for execution of works.

1.2 RELATED SECTIONS

.1 General requirements apply to the work described in this section

.2 Section 01 74 21 - Construction/demolition waste management and disposal

.3 Section 03 10 00 - Concrete forming and accessories

.4 Section 03 30 00 – Cast-in-place concrete

1.3 REFERENCES

This quotation refers to the latest edition and revision of codes and standards.

.1 Reinforcing Steel Institute of Canada (RSIC), RSIC-2004, Reinforcing Steel, Manual of Standard Practice.

.2 CSA A23.1-14 - A23.2-14 “Concrete materials and methods of concrete construction, test methods and standard practices for concrete”, article 6. Make the reinforcements and position them in the forms in accordance with the requirements of this Article unless they are modified or strengthened in this section.

.3 CSA-A23.3-14 - Design of concrete structures, articles 7 to 12.

1.4 DOCUMENTS / SAMPLES SUBMITTALS

.1 Drawings of reinforcement must be applied according to the Manual of Standard Practice.

.2 Submit shop drawings, which must show in particular , the location of the reinforcements, and specify or include the following:

.1 Rebar bending details.

.2 Rebar list.

.3 Number of rebar.

.4 Drawings must show the dimensions, spacing, location of rebar and if necessary, mechanical connections. The rebar that are shown must be marked by an identification code to identify their location without the need to consult the structural drawings.

.5 Drawings must also indicate the size, spacing, and placement of chairs, spacers and supports.

.6 Lengths of encasement and lengths of overlap must comply with CSA A23.3.

.3 Quality Control

.1 Report of the tests performed in the factory: provide the Professional with a certified copy of the steel reinforcements test report made at the factory.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Reinforcing steel: billet steel, grade 400, deformed bars compliant with CSA-G30.18.

.2 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.3 Cold-drawn annealed steel wire ties: compliant with ASTM A497/A497M.

.4 Deformed steel wire for concrete reinforcement: compliant with ASTM A497/A497M.

.5 Welded steel wire fabric: compliant with ASTM A185/A185M.

.6 Chairs, bolsters, bar supports, spacers: compliant with CSA-A23.1/A23.2.

.7 Mechanical splices: subject to approval of Quebec Ministry Representative.

.8 Plain round bars: compliant with CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ANSI/ACI 315 and the handbook “Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada”.

.2 The Professional must approve the locations of reinforcement splices other than those shown on placing drawings.

.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

Part 3 EXECUTION

3.1 FABRICATION OF REINFORCEMENTS

.1 The manufacture of reinforcement should begin only when drawings and slips of these reinforcements have been reviewed by the Professional.

.2 Cut and bend the bars in strict conformity with the details shown on the reinforcement drawings reviewed by the Professional. All bars should be bent cold.

.3 No substitution of bars shown on the reinforcement drawings reviewed by the Professional is permitted without the consent of the latter.

.4 Ship armatures to the site in separate batches labeled so that they are easily identified on the order forms.

.5 Take all precautions not to deform nor defile the reinforcements during transport, handling and storage on site.

3.2 IMPLEMENTATION OF REINFORCEMENT

.1 If necessary before positioning them in the forms, straighten cold reinforcement and get rid of excess rust, scales, mud, oil and other soiling which reduces adhesion concrete.

.2 Use an appropriate number of bar supports, with the height and rigidity required to allow covert everywhere that is consistent with thicknesses stipulated in Article 6 of CAN/CSA A23.1; in our case however bars 10-35 inclusive placed in slabs and walls not exposed to the weather or in contact with the ground, the thickness of the coating must be 25 mm. The distance between the bar supports must not exceed 1000 mm.

.3 All rebar must be position sufficiently in advance to allow the Professional to make full inspection before the start of each cast.

3.3 REINFORCEMENT CONCRETE COVER

.1 Cover of reinforcements of structural elements must comply with CSA-A23.1 and CSA-S413, latest editions and respect the following table:

• Structural slab	Steel at top Stee at bottom	25 mm ± 10mm 25 mm ± 10mm
• Beam (stirrups)	Steel at bottom And on sides	30mm ± 10mm
• Foundation wall and interior wall	Typical In contact with ground	25mm ± 10mm 50mm ± 10mm
• Colomn cast-in-place (ties)	Typical In contact with ground	30mm ± 10mm 50mm ± 10mm
• Footing	In contact with ground Cast against ground (leaning against ground)	50mm ± 10mm 75mm ± 10mm
• Others	see CSA-A23.1 (latest edition)	

3.4 TOLERANCE

.1 Tolerances allowed in the cutting of rebar are:

.1 10M and 15M bars and having a length less than 4 meters: + or 12 mm.

.2 10M and 15M and bars having a length greater than 4 meters: + or 25 mm.

.3 20M to 35M Bars: ± 25 mm.

.4 45M and 55M bars: ± 25 mm.

.2 Tolerances allowed in the shaping of bent rebar are the following

.1 Bars 10M to 35M:

.1 Overall length: 25 mm + or

.2 Overall height: 12 mm

.3 Hooks diameter: 12 mm or +

.2 Stirrups and ligatures:

.1 Width and overall height 12 mm or +

.3 45M Bars

.1 Width and overall height 65 mm or +

.4 55M Bars

.1 Width and overall height ± 90 mm.

3.5 WAITING REINFORCEMENTS

.1 It is prohibited to bend on-site reinforcement partially embedded in cured concrete unless the Professional has granted permission.

3.6 WELDING OF REINFORCEMENTS

.1 Welding of reinforcements is allowed in specific cases where the Professional granted permission.

.2 Any welding work should be done by an enterprise accredited by the Canadian Welding Bureau and must be performed in accordance with the requirements of CSA Standard W186. Submit in advance to Professional for approval all details of welds to be carried out. In this case, the reinforcing steel welding must comply with requirements of CAN/CSA G30.18 standard, 400W.

.3 If the welded joints are required, they will be of type "CADWELD" or an approved equivalent. Those joints will be able to resist tensile load equivalent to 125% of the specified yield strength of the bars to be join unless otherwise specified in the drawings.

.4 Subcontractor must verify the capacity of joints by destructive testing of joints made-in-place and selected by the Professional. All costs of such tests and corrective measures are incidental expense assumed by Subcontractor with the exception of laboratory testing costs which are paid for by the Contractor.

.5 Conformity verifications must have at least three (3) samples per used bar diameter and one sample per ten joints.

END OF SECTION

Part 1 GENERAL

1.1 DEFINITION

.1 The following definitions apply throughout this section of the quote

.1 Professional: consultant in structure or its representative on site during work execution

.2 Laboratory : the firm designated by the Ministry representative to perform material characterization tests.

1.2 RELATED SECTIONS

.1 Section 03 10 00 - Concrete forming and accessories

.2 Section 03 20 00 - Concrete reinforcing

.3 Section 01 74 21 - Construction-demolition waste management and disposal

.4 General requirements apply to the work described in this section

1.3 REFERENCES

This quotation refers to the latest edition and revision of codes and standards.

.1 CSA A23.1 - A.23.2-14: "Concrete materials and methods of concrete construction, test methods and standard practices for concrete"; Comply with each requirement of this standard applicable to work to be performed, and changes or clarifications contained in this section. If there is contradiction between the two, this section shall prevail.

.2 With reference to the above standards is an integral part of this section of the estimate, the Contractor must have a copy he keeps in his office the site.

1.4 QUALITY ASSURANCE

.1 The Contractor is responsible for the quality control of the product and must provide his quality control program for examination by the Professional.

.2 The Contractor must submit to the laboratory for examination and evaluation, the formulas proposed for the assay mixtures of each class of concrete, he must specify the type, brand and source of all additives used.

.3 The Contractor must provide the laboratory, upon request, samples of aggregates that will be incorporated into concrete mixes and identify their sources.

.4 Unless otherwise permitted in writing by the Professional, the laboratory must submit a test report performed by a laboratory recognized by him, certifying that the aggregates used in the manufacture of concrete are not likely to cause an expansion exceeding the values in table 1 of the standard method CAN / CSA-A23.2-27A.

.5 The laboratory is authorized to issue memos about the quality and the implementation of concrete to which the contractor must comply. This does not relieve the responsibility of the contractor of its obligations to perform the work according to the plans and specifications; the quality of concrete is not a guarantee that concrete works were executed according to plans and specifications.

.6 The Contractor must cooperate with the Laboratory's representative so that during each cast, he can closely monitor the implementation of concrete and collect samples required for control tests.

.7 The Laboratory will measure slump and air content of the concrete each time it will take samples for resistance testing, and as often as necessary in regard to the nature of the work to build.

.8 Professional reserves the right to inspect the work at the concrete factory of the Contractor at any time during opening hours. The Contractor must provide his cooperation during these visits.

1.5 CONCRETE SUPPLY

.1 All concrete must be supplied ready for use ("Ready-mix") by the same manufacturer. The concrete plant must hold a certificate issued by the "Bureau de normalisation du Québec" in accordance with NQ 2621-905 certification protocol.

.2 The manufacturer of the concrete ready for use is responsible for dosing it and must at its own expense take all necessary steps to ensure the quality and consistency of its product.

1.6 AUTHORIZATION OR APPROVAL OF PROFESSIONAL

.1 In accordance with the requirements of this section, the permission or approval of the Professional must not be regarded as having been obtained until he has been notified in writing or recorded in the minutes ratified by all persons attending meeting and where Professional was also attending.

1.7 NON-COMPLIANCE OF CONCRETE

.1 Remove defective concrete, wet or containing debris and repair as directed by the Engineer. Fill honeycombs before applying the asphalt coating on concrete surfaces.

.2 Under 75% of the compressive strength of concrete required, the Contractor will demolish the structure represented by the audit sample and rebuild at its expense as directed by the Engineer.

.3 From 76 to 80% of the compressive strength required, concrete, concrete quantity represented by the audit sample, will not be paid.

.4 From 81 to 99% of the required compressive strength of the concrete represented by the audit sample, the concrete will be paid 1/20 of the cost per 1% counted from 80%.

.5 If compressive strength of the concrete is exceeded, no bonus compensation will be awarded to the contractor.

.6 Additional verification samples will be at the expense of the Contractor and are performed to verify the result of the first sample.

As well, any additional work necessitated by non-compliance of concrete to specified requirements will be assumed by the Contractor.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Portland Cement for general use, according to CAN/CSA A3001, Type GU-SF.

.2 Water: according to CAN/CSA-A23.1/A23.2.

.3 Rebar: shade 400, according to CAN/CSA-G30.18.

.4 Steel mesh welded mesh : according to ASTM A185.

.5 Precast joint

.1 fiber-bituminous board, according to ASTM D1751.

2.2 CONCRETE CONSTITUENTS

.1 Conform to CAN/CSA-A23.1.

.2 Mixing water: fresh, clear and clean.

.3 Nominal size of coarse aggregate:

.1 14 mm in case of concrete slabs on metal deck;

.2 10 mm where there are high concentrations of armature;

.3 20 mm in all other cases.

.4 The use of calcium chloride or adjuvant containing aggregate is prohibited.

2.3 MIXES FORMULAS

.1 The sagging at the time and at point of discharge is minimum 75 mm and maximum 100 mm.

.2 Provide documented proof that the selected dosage will produce a concrete with the prescribed quality and yield and resistance provided in accordance with CAN/CSA-A23.1. Approval of the concrete formula must be done in conformance to materials sampled on site. However, the Contractor remains responsible for the result.

.3 Obtain approval of the laboratory before using chemical additives other than those specified in the mixing formula that was previously provided for verification.

2.4 MIXES

.1 Produce and provide normal weight concrete as specified in the table below and in accordance with the requirements of this specification and drawings.

Structural element	Type of exposure	Resistance at 28 days (MPa)	Cement Type	Ratio W / L	Aggregates	air-entrained	Note
Foundations, isolated footings	F2	30	GU	0.55	20	4% à 7%	--
Ground slab, interior	N	30	GU	0.55	20	4% à 7%	--
Foundation wall	F2	30	GU	0.55	20	4% à 7%	--
Columns/Pilasters, interior	N	30	GU	0.55	20	4% à 7%	--
Typical slabs and beams	N	30	GU	0.55	20 SIC	4% à 7%	--
Retaining wall, outside	F2	30	GU	0.55	20	4% à 7%	--
Sidewalks	C2	32	GU	0.45	20	5% à 8%	--

Part 3 EXECUTION

3.1 PREPARATION

.1 Ensure that erection of the formwork is completed, that they are clean and free of ice, snow and water, and the reinforcements and extra parts have been placed in accordance with the prescriptions of sections 03 10 00 and 03 21 00.

.2 If it is required to melt ice that adheres to reinforcement or to the inner walls of the formwork, use a steam jet or any other method approved by the Professional. The use of de-icing agents is never permitted.

3.2 AUTHORIZATION TO CAST CONCRETE

.1 Advise Professional at least 24 hours in advance whenever a concrete casting of any volume is planned.

.2 No concrete cast should be undertaken without the authorization of the Professional.

.3 The authorization will be granted only when the Professional has conducted his own inspection of forms and is satisfied in regard to the requirements of Article 3.1.

.4 It is prohibited to cast concrete when raining or snowing, unless the Professional is satisfied with the arrangements made to protect the concrete during transport and casting, and has granted permission.

.5 The authorization granted by the Professional to cast concrete when the outside temperature is below 5 ° C or above 25 ° C does not relieve the Contractor of any way of its responsibility with respect to the strength and durability of concrete which will be implemented.

3.3 PRODUCTION AND TRANSPORT OF CONCRETE

.1 Ensure that the temperature of concrete delivered to the site is to the opposite of the outside temperature when it will be implemented, but is below the lower and upper limits specified in Tables 16 of CAN/CSA A23.1.

.2 Plan the production of concrete and stagger deliveries to the site so that each casting can be carried out without interruption. Each batch of concrete must be fully discharged in the forms less than two (2) hours after the start of mixing.

.3 It is prohibited to add water to the concrete during the journey from factory to building site. It is also prohibited to add water to the concrete before the casting of concrete trucks, unless the Professional gave permission; if so, the amount of water added will be recorded on the delivery and certified by the representative of the professional who will then sign the slip.

3.4 IMPLEMENTATION OF CONCRETE

.1 Cast concrete without interruption or thick layers as each new layer will integrate with the underlying layers before the concrete thereof has hardened enough to cause cold joint.

.2 If difficulties arise during its implementation, change the formula of concrete as directed by the Professional or the laboratory and use the adjuvant prescribed by the Professional or the laboratory; the Contractor will assume all costs.

.3 Use appropriate vertical tubular conduit whenever the concrete must be deposited over a height of 1.5 meters or more.

.4 The addition of the superplasticizing admixture to concrete before it is casted in the forms is required when concrete walls with height greater than 2 meters (including retaining walls), and also columns beams containing a high concentration of reinforcement.

3.5 CONSOLIDATION OF CONCRETE

.1 Use internal mechanical vibrators and only entrust the handling to qualified operators. The diameter and the frequency of these vibrators are subject to approval by the Professional.

3.6 CURE AND PROTECTION OF CONCRETE

.1 Except for the items mentioned in paragraph below, the use of curing compounds is permitted provided that these products meet the specifications of ASTM C309 03 and they detract from the adhesion or the establishment finishes.

.2 In the case of floor tiles (or other items) exposed to the weather, sidewalks and curbs, the cure must be made in water by either of the methods described in section 21.1 .8 CAN/CSA A23.1 (water treatment).

.3 Ensure that, for the duration of his treatment, the concrete will not be loaded with any overload and will be adequately protected against violent impacts, excessive vibrations, weather and other disruptions.

.4 When the outside temperature is 27 C or more, comply with the requirements of CAN/CSA A23.1.

.5 When the outside temperature is 5 ° C or less, or when it is possible that it drops to that level or lower in the 24 hours following the casting of concrete, comply with the requirements of CAN/CSA A23.1.

.6 The supply, installation and maintenance of all temporary structures and devices required for curing and protection of concrete in hot weather or cold weather, as well as the power of these devices are part of the work contractors; bear all costs.

3.7 CONSTRUCTION JOINTS

.1 The location of construction joints defining each concrete casting must be approved by the Professional. If he thinks fit for reasons of structural continuity or appearance, the Professional may require that these joints get closer together or arranged differently.

.2 No construction joints shown on the plans should not be cut or moved without the authorization of Professional.

.3 Shape the vertical and horizontal construction joints in walls according to typical “groove and tongue” joint detailed on the plans. Also provide a longitudinal “groove and tongue” joint of a depth of 38 mm in any construction joint introduced into slabs having a thickness of 200 mm or more.

.4 Subject for approval by the Professional, details of all the overlapping splices required in frames, that pass through construction joints not shown on the plans or drawings of reinforcement.

.5 The execution of construction joints is part of the regular work of the Contractor and gives him no right to charge any supplement even when joints are added following the Professional guidelines.

3.8 RESUMING CONCRETE CASTING

.1 It is prohibited to undertake the concrete slabs and beams under two (2) hours after completing the walls and columns that support them, or while the concrete and the walls of these columns is still plastic.

.2 Immediately before resuming casting of concrete against a construction joint or above it, scarify the surface of hardened concrete to detach milt and fragments that adhere to it and to partially expose the coarse aggregate; Then clean the surface thoroughly and moisten without saturating.

.3 When the concrete is to be resumed over a horizontal construction joint introduced in a wall, a column or a beam of inverted T, pour a first layer of concrete having a thickness of 300 to 450 mm; use a mixture who collapse after adding a superplasticizing, is at least 150 mm and consolidate properly in place before resuming casting work.

3.9 SLAB ON GRADE

.1 Check that the embankments on which the concrete slabs will casted have been compacted and leveled to the satisfaction of the Departmental Representative and the laboratory, and they are clean and contain no traces of disturbed soil. If the work is performed in cold weather, make sure that these embankments are not frozen.

.2 Moisten the embankments before placing concrete; in doing so, avoid causing the formation of puddles and muddy or soft areas.

.3 It is prohibited to deposit directly on embankments welded wire mesh and other reinforcement required in slabs in preparation to raise and support the liquid concrete during its casting thereof.

.4 Increase if necessary the thickness of the slab to allow an overlap of at least 40 mm of concrete above and below the electrical conduits.

.5 In construction joints, 40 mm keys must be provided and coat the surface of the joint already in place with a curing agent to break the adhesion.

.6 Alternatively, the Contractor can make control joints with a saw, respecting the requirements for construction joints.

.7 In slabs, execute control joints in compliance with the following:

.1 Undertake this work 6 to 8 hours after casting, and complete within 18 hours after installation of the concrete.

.2 Use a chain saw equipped with a 5 mm thick blade and carve grooves with depth equivalent to a quarter (1/4) of the slab thickness.

.3 Immediately clean the grooves with a high pressure water jet to remove any milt accumulation.

.4 When concrete has completely dried, but not less than 21 days after its casting, dry clean each groove before closing them with self-leveling sealing mastic.

3.10 SLABS FINISHING SLABS AND HARDENER AND SEALER

.1 See architectural plans and structural and architectural specifications to determine the type of finish required for each slab of the building according to the requirements of sub-items .2 and .3 below.

.2 Slabs that will be covered with hard coating or screed, clean tiles, outdoor platforms and stairs, sidewalks: execute the last finish using wooden trowel to obtain slightly rough surfaces without ridges or ripples.

.3 The tolerance permitted in the finish, as defined by the CAN/CSA A23.1, is 8 mm to 3.00 meters.

.4 Interior slabs of the building whose concrete remain exposed or will be covered with carpeting or flexible coating or roof slab: execute the last finish using trowels equipped with metal blades; pass these trowels several times and at appropriate intervals to obtain dense and perfectly smooth surfaces without imperfections.

.5 The tolerance permitted in the finish, as defined by the CAN/CSA A23.1, is 5 mm to 3.00 meters.

.6 When drawings or slips require floor finish with hardener, apply a non-metallic uncolored aggregate such as Diamag 7 Sika approved or an equivalent at the minimum rate of 5 kg per square meter and following manufacturer's instructions.

.7 The floor where concrete surfaces remain exposed (without paint, carpet, tile or other finish) must receive after applying hardener and after curing of concrete, two coats of

sealer to minimize dust accumulation. This sealer must meet the requirements of CAN/CGSB-25.20 "Primer floors" of the following types as indicated on the drawings:

.1 Flortec 22 clear or an approved equivalent.

.2 Sikaguard Color A50 color "gray" or an approved equivalent.

.3 Sikaguard Clear / Seal 2 or an approved equivalent.

.4 71H Sikaguard or an approved equivalent.

.5 Sikaguard Clearsel or an approved equivalent.

The first layer is applied after the concrete has cured, the second following a delay of 6 months to 12 months after the first application.

3.11 TREATMENT OF FORMED SURFACES

.1 Nests of pebbles spotted on the concrete surface at the time of stripping should not be repaired before the Professional has reviewed them and has accepted the corrective methods to be used.

.2 Burrs, unsightly streaks and other irregularities on formed surfaces that remain exposed or that will receive a waterproofing membrane, must be removed within 24 hours after stripping. Holes left by the rods must also be closed at the same time.

3.12 CUTS, HOLES AND NOTCHES IN CURED CONCRETE

.1 It is never allowed for any reason whatsoever; to cut, drill hole or notch already cured concrete elements, unless the Professional has granted permission.

.2 Any cut, hole or notch into the cured concrete authorized by the Professional must be performed in the exact place and according to the exact dimensions approved by him. Use rotary tools that prevent bursts.

3.13 TOLERANCES

.1 If tolerances specified by CAN/CSA A23.1 were not met during the construction of any element whatsoever shown on plans, the Professional may require that this element be demolished and rebuilt following the tolerances of that article, without additional cost to the Owner.

END OF SECTION

PART 1 GENERAL

1. Section 01 74 21 - Construction/demolition waste management and disposal

1.1. REFERENCES

1. American Society for Testing and Materials International, (ASTM)
    1. ASTM A36/A36M, Specification for Structural Steel.
    2. ASTM A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
    3. ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
    4. ASTM A325, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
    5. ASTM A325M, Specification for High-Strength Bolts for Structural Steel Joints [Metric].
    6. ASTM A490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
2. Canadian General Standards Board (CGSB)
    1. CAN/CGSB-85.10, Protective coatings for metals.
3. Canadian Institute of Steel Construction (CISC)/ Canadian Paint and Coatings Association.
    1. ICCA/AFPC 1-73b, Paint a quick-drying layer for structural steel.
    2. ICCA/AFPC 2-[75], Primer coat paint quick-drying for structural steel.
4. Canadian Standards Association (CSA)
    1. CAN/CSA-G40.20/G40.21, General requirements for laminated or welded structural steel.
    2. CAN/CSA-G164, Hot galvanizing of irregularly shaped objects.
    3. CAN/CSA-S16, Limit States Design of Steel Structures.
    4. CAN/CSA-S136, Limit States Design of Steel.
    5. CSA-S136.1, Commentary on CSA Standard S136.
    6. CSA W47.1, Certification of fusion welding companies of steel structures.
    7. CSA W48, Filler metals and associated materials for arc welding.
    8. CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
    9. CSA W59, Welded steel construction (arc welding) (metric units).
5. Master Painters Institute
    1. MPI-INT 5.1, Structural Steel and Metal Fabrications.
    2. MPI-EXT 5.1, Structural Steel and Metal Fabrications.
6. The Society for Protective Coatings (SSPC)
    1. SSPC SP-6/NACE No. 3, Commercial Blast Cleaning

1.2. WORKSHOP DRAWINGS

1. Submit to the Professional for approval complete and detailed shop drawings and erection of the steel frame to be executed.
2. Workshop and erection drawings shall contain all the information specified in 4.1 and 4.2 of CAN / CSA S16.1 and include the signature of the person who checked them before they were issued for approval. Drawings not verified by the Contractor will be refused and returned to the Contractor.
3. The drawings must include the signature and seal of the Engineer of the manufacturer who designed the assembly details and who is an active member of "l'Ordre des Ingénieurs du Québec".
4. In the case of the beams, the shop drawings must :
    1. Indicate the load calculations used and the cambers required to compensate for the loading under the dead weight;
    2. Supply the efforts of all the beam chords plus all the details relative to the supports, struts, etc. and also à list of materials required for the fabrication and assembly;
    3. Stamped and signed by an active engineer of "l'Ordre des Ingénieurs du Québec".
5. The title of the project and the names of the client, the Professionals and the Contractor must appear on each shop and erection drawing.
6. The Contractor is authorized to use the engineering drawings, emitted for construction, as installation drawings, but must be replaced by the Contractor's drawing with the seal of the Professional removed.
7. The installation drawings must be referenced to the contract number and to its subsequent engineering drawing.
8. The Contractor must not commence the fabrication of the framework elements prior to approval of the shop and erection drawings by the Professional.

1.3. ANCHORAGES IN CONCRETE

1. The expanding shell, the chemical (epoxy), the masonry anchorings and the anchoring bolts to the column base are to be supplied by the Contractor.

1.4. ANCHORAGES TO MASONRY

1. At points where the masonry partitions meet the steel columns, supply and install plates (25mm width x 300mm length x 400mm thickness) spaced at 600mm c/c. See the architect drawings for the location of the partitions.
2. At the tops of the masonry partitions, under the girders and beams and between the steel or concrete, supply and install the supports to the masonry walls. The supports will be made of 75mm X 75mm X 5mm angle irons 400mm length, placed at 1200mm c/c, alternately on each side of the wall.

1.5. QUALITY ASSURANCE

1. The Contractor must have a quality control (QC) program, in which must be approved by a Professional, generally in accordance with the ISO-9002 standard. The program must be submitted to the Professional.
2. Obtain the certificates emitted by the steel mill attesting that the chemical composition

and the physical properties of the steel used prior to fabrication, and submit these documents to the Professional.

3. Conserve at the fabrication shop all the QC notes and the non-destructives tests data for examination by a Professional.
4. Prior to fabrication, submit for examination by a Professional the shop welding procedures. The site welding procedures must also be submitted.
5. The Professional reserves the right to inspect the Contractor's shop work and that of the Suppliers and Sub-contractors, during any time during work hours. The cooperation during the visits must be in accordance with the CAN/CSA– S16.1 Standards, clause 31.2.

PART 2 PRODUCTS

2.1. MATERIALS

1. Laminated profiles or welded, plates and bars: in conformity with the specifications from the CAN/CSA–G40.20 and CAN/CSA–G40.21 standards. Use 350W grade steel, with the exception to the beam chords which can be 380W grade steel and the L and C profiles can be 300W grade steel.
2. Tubes: in conformity with the specifications from the CAN/CSA–G40.20 and CAN/CSA–G40.21 or ASTM A500 standards. Use 350W grade steel, class C, unless otherwise indicated on the drawings.
3. Anchor bolts: in conformity with the specifications from the ASTM A307 standard, unless otherwise indicated on the drawings.
4. High resistance bolts: in conformity with the specifications from the ASTM A325 standard.
5. Steel deck fixation with standard steel rockwell 55 HRC, with 5 micrometers of zinc in conformity with specifications of ASTM B633, SC1, type III.
6. Welding electrodes: in conformity with the specifications from the ACNOR W48 standard.
    1. One coat rapid drying paint: in conformity with the specifications from the 1–73a ICCA/AFPC standard, grey color. See article 3.6.
    2. Metallic deck: galvanized steel sheeting in conformity with the specifications from the ASTM A653M, SS grade 230. Use steel sheeting covered with one coat of zinc equivalent to Z275 from the ASTM A525M standard.

3. Hot emersion galvanization: according to indications, galvanized steel elements in conformity with the specifications from the CAN/CSA G164 standard, with at least 600 g/m2 galvanization.

PART 3 EXECUTION

3.1. SITE VERIFICATION

1. Verify all dimensions and elevations on site prior to commencing the fabrication of the framework elements. The verification must be conducted early enough as to avoid delays at the site.

3.2. SUBSTITUTION

1. All substitution of specified materials in articles 2 or to the profile sections indicated on the drawings must be approved in writing and written by a Professional. The Professional could demand that the calculations justifying the substitutions be submitted.

3.3. FABRICATION

1. Supply all new materials required.
2. All the framework elements must be fabricated in the Contractor's shop.
3. Must be rigorously in conformity with the CAN/CSA–S16.1 standard as well as the details as shown on the shop drawings.
4. Adequately arch the beams for which a camber is specified on the drawings.
5. Close the open-end deep profiles with 6mm minimum end plates. Allow holes for inspection and flow.
6. Avoid forming in the steel framework water and dust receivers. Pierce drainage hole when required.
7. All elements where the fabrication tolerances where not observed or that represent poorly executed welding is subject to be rejected by the Professional.

3.4. ASSEMBLY

1. Design and calculate the assemblies in function of the forces, bending moments and cutting edges indicated on the drawings. In the case of the beams, the assemblies must be at least equivalent to those indicated in Tables 3–56 to 3–79, 9th édition, - revision 3 of the « Handbook of Steel Construction » published in 2007 by the Canadian Steel Construction Institute.
2. Moreover, the beam assemblies to their extremities must resist to at least 60% of the total uniformly fractures distributed load that can support the beam while supposing that the compressed base is laterally supported throughout the entire load. The end plates or the beam assembly angle irons will have at least a 8mm thickness and the welding chords at least 6mm.
3. Unless otherwise indicated on the drawings, all the shop executed assemblies must be welded. If bolted assemblies are specified, high resistance bolts must be used.

4. Unless otherwise indicated on the drawings, all the site executed assemblies must be diametrically pressure bolted, except for the rigid assemblies (that can resist to a moment) must be friction type using a ks value = 0.33 and c1 = 0.82 and the appropriate cleaning. The Contractor can use superior values only if he can demonstrate to the Professional that the surfaces in contact at the time of assembly meet the requirements permitting the use of such values.
5. The assembly of the bracings must be conceived while supposing that limited ductile bracing framework that meets the requirements as per article 27.6 from the CAN/CSA–S16.1 standard.
6. The assembly of the bracings will be done with diametrical pressure while considering the calculated charges as per the requirements of article 27.5.3 from the CAN/CSA–S16.1 standard.
7. When the loads that must be transmitted are not indicated on the drawings, the weldings will be calculated in a manner as to be able to mobilize the full capacity of the elements that unit them.
8. The Contractor must submit to the Professional the calculation notes of all assemblies in which the design is subject to disagreement.
9. Before submitting the detailed shop drawings, submit for examination by the Professional, with the calculation verifies, signed and sealed by a licensed Engineer, the non-standard, offset or site welded assemblies.
10. The offset assemblies or situated on only one side of the web must not be used unless it is impossible to detail a symmetric assembly.

3.5. BEAMS

1. Design and calculated the beams as a function of the loads and the spacing as indicated on the drawings. Conform to the notes as per the CAN/CSA–S16.1 standard
2. Conform to the indications supplied on the drawings relatively to the extension of the bottom chords and/or the top chords.
3. Unless otherwise required on the drawings, it is never permitted to pierce the bases of the top or bottom of a beam.
4. Unless otherwise indicated, the flex caused by the overburden must not exceed l/300 of span for the roofs and l/360 for the floors.
5. The camber must be equal to the flex under the dead load.

3.6. DELIVERY / HANDLING / STORAGE

1. Load, transport and deliver the steel to the site. Take required precautions as to not damage the elements and the painted elements while handling and transportation.
2. See that the painted surface are not stacked face together, however separate them with wooded blocks, foam or other convenable materials.
3. Use nylon slings for lifting materials, and if required use appropriate spreaders or cradles.
4. Firmly attach the steel with chains and shims to the transport vehicules to avoid all horizontal mouvement. Protect the metallic edges with rubber, burlap or wood. Do not load small sections in packages inside large « U » shaped profiles or beams.

1. Unload at the selected site. Suppply the material and manpower to conduct the loading without damage and place the pieces on wooden blocks supplied by the Contractor.
2. Adequately chose wooden block dimensions and space them correctly to avoid all contact with the stacked steel and the ground.

3.7. ERECTION

1. The propose technique as well as the material used to erect the framework are subject to approval by the Professional. This approval does not free the Contractor of his entire responsibility with respect to the choice of the technique and the mobilization of the materials that will permit him to rapidly and safely execute his work.
2. Properly attach the bracing to the framework, the transversal linkage and bracing cables with sufficient resistance to support the loads due to windy conditions, as long as the installation of the final framework elements are not completed.
3. Leave the temporary bracing in place if the permanent stability of the construction depends on the subsequent work from other trades, until all this work is completed.
4. The framework must be erected in strict conformity with the prescriptions of article 30 from the CAN/CSA–S16.1 standard.
5. Report to the Professional as soon as possible all defects noted in the assembly of the elements fabricated in the shop and his decision to make corrections.
6. Straignten all lightly bent elements prior to site assembly and replace all elements that are damaged to the degree that their efficiency can be doubted by a Professional.
7. It is strictly forbidden to execute site assembly welding unless they are indicated on the shop drawings or that they have been pre-approved by a Professional.
8. Introduce metal wedges under the column bases in order to maintain them vertically and level while the filling mortar is curing.
9. It is strictly forbidden to pierce or torch cut or modify in any manner on the site an element of the framework without having prior written authorization by a Professional.
10. Once the erection works are completed, apply a coat of paint on the welds and bolted joints executed on the site, and touch-up the torched surfaces or scrapes incurred during the works.

3.8. METAL DECK

1. The decking must be designed and fabricated according to the requirements from the CAN/CSA– S136 standard.
2. The decking must have a minimum steel sheeting thickness and profile thickness in conformity with the drawings and capable of supporting the loads as indicated on the drawings. The decking must have laterally interlocking surfaces and the floors must be high adherence type.
3. Store at the site and then erect the metal deck in conformity with the manufacturer’s directives.
4. Erect the metal deck in a manner as to assure a continuity of at least 3 spans.
5. Join the top panels in a manner such their extremities overlap at least 50mm.

6. Unless otherwise indicated on the drawings, attach the panels to each metal frame support using washers and punctual 20mm arc welds with diameters placed at each groove according to the 914/7 weld pattern.
7. Unless otherwise indicated on the drawings, attach the panels to all supporting elements that are parallel to the each groove using washers and punctual 20mm arc welds with diameters placed at each groove according to the 914/7 weld diameter spaced at 900mm maximum.
8. In the case where the elements are no in contact with the decking (main support elements lower than the secondary supports) add a support (HSS 101.6 x 101.6 x 4.78 by 100 mm length, for example) between the deck and the support element in order to respect the 900mm weld spacing.
9. Mechanically connect the male and female sides of the panels adjacent to the intervals not exceeding 450mm, unless otherwise indicated on the drawings.
10. It is strictly forbidden to have at the site, any openings that are 150mm diameter or more or from the side without reinforcing the deck around these openings. The details of the reinforcements must be shown on the shop drawings and submitted to the Professional for approval.
11. Attach 75 mm x 75 mm x 6 mm support angles in front of the columns.
12. Once the deck is attached in its final position, touch-up with primer all surfaced that have been torched during welding.
13. Attach the groove closings at locations that must contain poured concrete according to the manufacturer's recommendations.

3.9. QUALTY CONTROL – SITE AND SHOP

1. The Contractor will conduct all work applying a quality assurance program in general accordance with the ISO-9002 standard.
2. The Contractor must conduct non-destructive of the following welds :
    1. radiographic control of end-to-end welds ;
    2. magnetic powder vtests on chord welds;
3. Ultrasonic test of full-penetration on « T » weld. The tests will be conducted on randomly selected welds as follows:
    1. Chord welds: 5%
    2. Full-penetration shop welds: 25%
    3. Full-penetration site welds : 50%
4. If the defects exceed the limits as per the CSA W59 standard, conduct tests on the complete length of the weld. Conduct the repairs and test the repaired welds once again. If the defects in the repaired welds persist, repair again until acceptance is obtained. The repairs and additional testing are at The Contractor's expense.
5. In order to be acceptable, the welds must respect the criteria as per the CSA W59 standard.
    1. If the Professional deems appropriate, he could, to verify the quality control, the inspection and the Contractor's test, use an inspection laboratory in which the services are retained by the Owner.

3.10. SHOP PAINTING

1. All steel must have a coat of paint in accordance with the specifications from the 1–73a ICCA/AFPC standard on the surfaces of all the framework elements with the exception of those that will be in contact with concrete or must conserve their natural adherence in the interior of the assemblies by friction.
2. Bolt heads, washers and assembly nuts including all welded surfaces at the site or damaged must be painted or touched-up using the same painting system.
3. Conduct the described work at the sub-articles below at the shop and in strict conformity with the prescription in article 29 from the CAN/CSA–S16.1 standard.
4. Prior application of rapid-drying paint, all grease and oil must be removed in conformity with the SP1-63 SSPC standard (Cleaning with Solvents) and all steel must be cleaned according to an appropriate method as to eliminate rust, peeling, dirtying, the welding cleanser, etc. to a degree equivalent to the illustrated standard «DST 2» from the VIS-1 SSPC «Photographic color standards for the preparation of surfaces» standard. The use of an « anti-splatter » product is required for the apparent steel trellis post pieces, the round HSS posts, the bracings and the beam connections.
5. The paint must not be applied if the steel surface is humid due to rain or condensation or if the relative humidity exceeds 85% and if the ambient temperature risks to be below 5°C before the paint is dry enough for manipulation.
6. The paint can be applied when the temperature is above 15°C and when the steel surfaces are in the temperature range of 5°C to 35°C.
7. All paint works must be conducted according to the paint manufacturer’s recommendations and requirements ant according to the requirements indicated in the present document, and thus following the strictest requirements.

3.11. SITE PAINTING

1. Unless otherwise indicated, touch-up with a coat of primer paint in conformity with the SSPC-SP-6 standard all damaged surfaces and those that were not painted in the shop. Apply the paint in conformity with the requirements of the CAN/CGSB 85.10 standard.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A 53/A 53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA International
- .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA S16-09, Design of Steel Structures.
- .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

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

.7 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, tubing and bolts.
- .2 Submit two copies of WHMIS MSDS.
  - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.2 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.03 QUALITY ASSURANCE

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

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 DESCRIPTION

.1 Design metal stair, balustrade and landing construction and connections to National Building Code of Canada (NBC) vertical and horizontal live load requirements.

.2 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

2.02 MATERIALS

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

.2 Steel pipe: to ASTM A 53/A 53M standard weight galvanized finish.

.3 Floor plate: to CSA G40.20/G40.21, Grade 260 W

.4 Metal bar grating: to ANSI/NAAMM MBG 531, Type W-19-4, with checkered plate nosings.

.5 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A 307.

.6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.02 FABRICATION

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

.2 Use self-tapping shake-proof oval headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.03 ASSEMBLY

.1 Fabricate in accordance with NAAMM, Metal Stair Manual.

.2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings,

cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.3 Accurately form connections with exposed faces flush:
- .1 Make mitres and joints tight.
- .2 Make risers of equal height.

.4 Grind or file exposed welds and steel sections smooth.

.5 Shop fabricate stairs in sections as large and complete as practicable.

2.04 PLATE/GRATING STAIRS

.1 Form treads from 6 mm thick steel plate to profile indicated, and secure to stringers with L 35 x 35 x 5 supports. Form landings from 6 mm thick steel plate, reinforced by L 55 x 55 x 6 spaced at 600 mm on centre.

.2 Form steel grating treads and landings from metal bar grating to profile indicated and secure to stringers and supports as indicated. Form landings of steel grating and reinforce as required.

.3 Form stringers from MC 310 x 15.8.

2.05 PIPE/TUBING BALUSTRADES

.1 Construct balusters and handrails from steel tubing.

.2 Cap and weld exposed ends of balusters and handrails.

.3 Terminate at abutting wall with end flange.

2.06 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m2 to CAN/CSA-G164-m92 (r2003)

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.07 SHOP PAINTING

.1 Primer: VOC of a maximum of 250g/L as per GS-11

.2 Metal component except galvanized ones or components to be cast in concrete must receive a primer coat shop applied. Apply one coat of shop primer except interior surfaces of pans.

.3 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.4 Surfaces to weld on site must be cleaned and shall not be painted.

2.08 ANGLE LINTELS

.1 Steel angles: prime painted, sizes indicated for openings. Provide 200 mm minimum bearing at

ends.

.2 Weld or bolt back-to-back angles to profiles as indicated.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 ERECTION

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

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:

.1 Primer: maximum VOC limit 250 g/L to GS-11.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

.1 Primer: maximum VOC limit 250 g/L to GS-11.

3.03 INSTALLATION OF STAIRS

.1 Install in accordance with NAAMM, Metal Stair Manual.

.2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.

.3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

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

.5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.04 PIPE RAILINGS

.1 Install pipe railings as indicated.

3.05 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.06 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 CSA International
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121-08, Douglas Fir Plywood.
- .3 CSA O141-05(R2009), Softwood Lumber.
- .4 CSA O151-09, Canadian Softwood Plywood.
- .5 CAN/CSA-O325.0-07, Construction Sheathing.
- .6 CAN/CSA-Z809-08, Sustainable Forest Management.

.2 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.3 Green Seal Environmental Standards (GS)
- .1 GS-11-11, Paints and Coatings.

.4 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2010.

.5 Sustainable Forestry Initiative (SFI)
- .1 SFI-2010-2014 Standard.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for rough carpentry work and include product characteristics, performance criteria, physical size, finish and limitations.

1.03 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:
- .1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate.

1.04 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 CAN/CSA-Z809 or FSC or SFI certified.

.2 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
- .1 S2S is acceptable for concealed elements
- .2 Board sizes: "Standard" or better grade.
- .3 Dimension sizes: "Standard" light framing or better grade.
- .4 Post and timbers sizes: "Standard" or better grade.

.3 Panel Materials:
- .1 Douglas fir plywood (DFP): to CSA O121, standard construction.
  - .1 Urea-formaldehyde free.
- .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.
  - .1 Urea-formaldehyde free.
- .3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.
  - .1 Urea-formaldehyde free.

.4 Wood Preservative:
- .1 Surface-applied wood preservative: copper naphthenate water repellent preservative.

2.02 ACCESSORIES

.1 Fasteners: to CAN/CSA-G164, for exterior work.

.2 Nails, spikes and staples: to CSA B111.

.3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

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

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry installation in accordance with

manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat material as indicated:

.1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.

3.03 INSTALLATION

.1 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.

.2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

.4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.6 Install sleepers as indicated.

.7 Use caution when working with particle board. Use dust collectors and high quality respirator masks.

.8 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.9 Countersink bolts where necessary to provide clearance for other work.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.1-09, Particleboard.
- .2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
- .3 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.

.2 ASTM International
- .1 ASTM E 1333-10, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
- .2 ASTM D 2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .3 ASTM D 5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
- .1 Architectural Woodwork Standards (AWS).
  - .1 AWS Manual - (2014)

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.5 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .3 CSA O121-08, Douglas Fir Plywood.
- .4 CSA O141-05 (R2009), Softwood Lumber.
- .5 CSA O151-09, Canadian Softwood Plywood.
- .6 CSA O153-M1980 (R2008), Poplar Plywood.
- .7 CAN/CSA-Z809-08, Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.7 Green Seal Environmental Standards (GS)
- .1 GS-11-11, Paints and Coatings.
- .2 GS-36-11, Commercial Adhesives.

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

.9 National Electrical Manufacturers Association (NEMA)
- .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

.10 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2010.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with AWS requirements, showing construction details sections, assembly details, anchors and other pertinent details.
  - .1 Full scale drawings and half scale details
- .2 Drawings must indicate materials, finishes, thicknesses and hardware components.
- .3 Indicate on casework and counter top elevations location of backing required for attachment within walls, the openings required in the furniture for the electrical hookups, the accessories and anchors, including the location of the visible anchoring devices.

.3 Samples:
- .1 Submit two sample sets of the color selection available for the plastic laminates..

1.03 QUALITY ASSURANCE

.1 Work in accordance with Grade or Grades specified of the AWS.

.2 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and acceptation: deliver materials on site in the manufacturer’s packaging bearing the name and address of the manufacturer.
- .1 Protect the architectural woodworks from moisture and damages during and after their delivery.
- .2 Store materials indoors and in accordance with temperature and humidity range recommendations by the AWS in clean, dry, well-ventilated area.

.3 Storage and Handling Requirements:
- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, moisture content in accordance with following standards:
- .1 CSA O141 Standart

.2 CAN/CSA-Z809 or FSC or SFI certified.
.3 National Lumber Grades Authority (NLGA)

.4 AWMAC custom grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Douglas fir plywood (DFP): to CSA O121, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
.1 Plywood resin to contain no added urea-formaldehyde.

.4 Fibreboard must contain less than 10% roundwood by weight, using weighted average over three month period at manufacturing locations.
.1 Fibreboard resin to contain no added urea-formaldehyde.
.2 CAN/CSA-Z809 or FSC or SFI certified.

.5 Laminated plastic for flatwork to CAN3-A172, catégorie GPPL, 1.14 mm thick; colour indicated on the drawings selected from Wilson Art, Formica and Lab Designs (855 230 5394).

.6 Laminated plastic backing sheet: minimum of 0.5 mm thick or same thickness and colour as face laminate.

.7 Thermofused Melamine: to NEMA LD3 Grade VGL (for vertical surfaces.
.1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).

.8 Nails and staples: to CSA B111.

.9 Wood screws: type and size to suit application.

.10 Splines: metal.

.11 Laminated plastic adhesive:
.1 Adhesive: urea resin adhesive to CSA O112.5, contact adhesive to CAN/CGSB-71.20, resorcinol resin adhesive to CSA O112.10, polyvinyl adhesive to CSA O112.10 or two component epoxy thermosetting adhesive.

.12 Hardware: See on drawings, millwork details.

2.02 FABRICATION

.1 Set nails and countersink screws apply wood filler to indentations, sand smooth and leave ready to receive finish.

.2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.3 Shelving to cabinetwork to be adjustable unless otherwise noted.

.4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.5 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.7 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.8 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 3000 mm. Keep joints 600 mm from sink cutouts.

.9 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.10 Apply laminate backing sheet to reverse side of core of plastic laminate work.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 INSTALLATION

.1 Install work in conformance with the AWS.

.2 Install architectural woodworks at the locations indicated on the drawings

.1 Install them with precision, plumb and square.

.3 Fasten and anchor millwork securely.

.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.4 Use draw bolts in counter top joints.

.5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.

.7 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.

.8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

.9 Install plastic laminate at location indicated.

.1 Glue the plastic laminate on the entire surface.

.2 At the angles, execute the joints perfectly adjoining

.3 Use full size plastic laminate sheets
.4 Execute joints only at approved locations.
.5 Bevel slightly the edges.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  .1 Clean millwork and cabinet work, inside cupboards and drawers and outside surfaces.
  .2 Remove excess glue from surfaces.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.04 PROTECTION

.1 Protect millwork and cabinet work from damage until final inspection.

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

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.04 AMBIENT CONDITIONS

.1 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

2 PRODUCTS

2.01 SHEET MATERIALS

.1 Air barriers sheet type 1: self-adhesive membrane composed of SBS modified bitumen and a tri-laminated woven polyethylene facer, thickness of 1 mm.
- .1 Water vapour transmission (ng/Pa·s·m2) ASTM E96 (Procédure B) < 0,90 (< 0,016 perm)
- .2 Air permeability (L/sec·m2) ASTM E283 (75 Pa) < 0,0003
- .3 Underface (roll full width) – Silicone release film
- .4 Upper protection – Woven polyethylene facer
- .5 Tensile Strength, L/T (kN/m) ASTM D5147 11,3 / 15,4 (64 / 88 lb/po.)
- .6 Ultimate Elongation, L/T (%) ASTM D5147 40 / 25
- .7 Flexibility at cold temperature (°C) ASTM D5147 -35 (-31 °F)
- .8 Static Puncture (N) ASTM D5602 400 (90 lb)
- .9 Tear Resistance, L/T (N) ASTM D5601 375 / 400 (84 / 90 lb)
- .10 Lap adhesion (N/m) ASTM D1876 2000 (11,4 lb/po.)
- .11 Water absorption (%) ASTM D5147 0,1 max.
- .12 Peel Resistance (N/m) ASTM D903 2800 (16 lb/po.)

.2 Air barriers sheet type 2 : composed of a proprietary formulation of elastomeric styrene-butadiene-styrene (SBS) polymer modified bitumen in combination with a high tack self-adhesive layer and is reinforced with tough, dimensionally stable non-woven polyester mat, thickness of 3 mm.
- .1 Peal load elongation (kN/m) longitudinal = 7,8, transversal = 7,2

.2 Tensile Strength (N/5cm): longitudinal = 15, transversal = 13,5
.3 Ultimate elongation (%): longitudinal = 40, transversal = 25.
.4 Low temperature flexibilitu at -30°C: no cracking.
.5 Softening temperature: ≥ 110°C.
.6 Static Puncture (N) ≥ 400.
.7 Air Barrier, conforming to norme CAN/CGSB-37.56-M, 9ième edition

2.02 ACCESSORIES

.1 primer for self-adhesive membrane:
.1 Solid content: 24 %
.2 Installation température: -10*C to 40*C.
.3 Viscosity, Brookfield (cps, 25ºC) 200 cP
.4 Flash point temperature (ASTM D-93) –3ºC (26ºF)
.5 Drying time 15 to 60 minutes according to temperature and quantity

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 GENERAL

.1 Perform Work in accordance with manufacturer’s installation instructions.

3.03 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Departmental Representative in writing.

.4 Do not start work until deficiencies have been corrected. Beginning of Work implies acceptance of conditions.

3.04 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

3.05 INSTALLATION

.1 Secure self-adhesive sheet between frames and the sealing material of the adjoining walls.
.1 Position lap seal over firm bearing.

3.06 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.07 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

3.08 SCHEDULES

.1 Window Frame Perimeter:
- .1 Lap sheet seal Type 1 from wall air seal surface with 75 mm of full contact over firm bearing to window frame with 25 mm of full contact.
- .2 Edge seal with Type Z sealant.

.2 Wall and Roof Junction:
- .1 Lap sheet seal Type 3 from wall seal material with 150 mm of contact over firm bearing to roof air seal membrane with 100 mm of full contact.
- .2 Seal with Type X sealant.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Office des normes générales du Canada (ONGC ou CGSB)
- .1 CAN/CGSB-93.1-M85, Tôle d'alliage d'aluminium préfinie, pour bâtiments résidentiels.

.2 CSA International
- .1 CAN/CSA-S136-F07, Norme nord-américaine pour les éléments de charpente en acier formés à froid.
- .2 CSA S136.1-07, Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.
- .3 CAN/CSA-16.1-M89, Limit states Design of Steel Structures.
- .6 ULC
  - .1 ULC / S-102-M88 Standard methods of fire endurance tests of building construction and materials
  - .2 ULC / ORD C-376 Fire growth of foamed plastic insulated building panel in a full scale room configuration.

1.02 SYSTEM DESCRIPTION

.1 Composite panel system consisting of interior and exterior preformed, interlocking steel panels with injected polyisocyanurate foam core.
.2 The exterior metallic faces are corrugated
.3 The panel must include a decompression cavity and evacuation channel to drain condensation or infiltration water to the exterior.
.4 Concealed anchorage system, designed to minimize thermal bridging.
.5 Pre-form steel panel lateral edges with offset joint system with butyl seal.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for building panels, hardware, and accessories] and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.
- .2 Indicate on drawings:
  - .1 Dimensions, wall openings, head, jamb, sill and mullion detail, materials and finish, anchor details, compliance with design criteria and requirements of related work.

.3 Samples:
- .1 Submit duplicate 300 x 300 mm samples of wall system, representative of materials, finishes and colours.

1.04 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for composite metal building panels for incorporation into manual.

1.05 QUALITY ASSURANCE

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

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

1.06 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section [01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions].

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect metal building panels, hardware and accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.07 WARRANTY

.1 Provide a five (5) year manufacturer's warranty to include coverage for failure to meet specified requirements. Submit a written warranty certifying the works will be free of deficiencies for a period of five years, including labor and materials.

.2 Performance specifications from steel suppliers will cover degradation of panel finish including color fading caused by exposure to weather, defect in design

2 PRODUCTS

2.01 DESIGN REQUIREMENTS

.1 Design the system meeting the National Building Code, standards and regulations applicable according to their latest version and standard practice of the science of building.

.2 Design metal panel wall to allow for thermal movement of component materials without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.3 Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.4 Design members to withstand dead load and wind loads calculated in accordance with National Building Code of Canada (NBC) and applicable local regulations, to maximum allowable deflection of 1/180th of span or 15mm.

.5 Design anchor system to support the negative and positive wind pressure. Design anchors to transmit minimum load of 410 kg to structural support elements without achieving its rupture limit or damaging panels.

.6 The interior steel sheet of the panel is the air and vapour barrier.

.7 Thermal resistance: indicated on the drawings is the minimum required, calculated with design wind loads in accordance with ASHRAE procedures.

2.02 PREFINISHED STEEL SHEET

.1 Exterior Steel
Sheet Steel: ASTM A653/A653M, commercial grade galvanized steel. Thickness 0.721 mm
Panel width: 1080 mm or 914 mm, see drawings
Paint color : see drawings
Exterior face: ribs of small dimensions
Dimensions : see drawings

.2 Interior Steel
Sheet Steel: ASTM A653/A653M, commercial grade galvanized steel. Thickness 0.53 mm
Panel width: 1080 mm or 914 mm, see drawings
Paint color : see drawings
Exterior face: ribs of small dimensions
Dimensions : see drawings

2.03 INSULATION

.1 Expanded polyurethane foam applied by spray

.2 Thickness : see drawings

2.04 ACCESSORIES

.1 Panel Supports and Anchorages: Steel sheet, hot-dip galvanized to ASTM A653/A653M, 1.58 mm (16 gauge), to dimensions and profiles indicated. Anchors must allow adjustment in relation of site conditions and tolerances.

.2 Metal Flashings, Closures: Steel sheet, hot-dip galvanized to ASTM A653/A653M, 0.053 mm (26 gauge), to dimensions and profiles indicated. Flashing must allow adjustment in relation of site conditions and tolerances. Color identical to panels

.3 Fasteners: Exterior Finishing Screws: Self-fastening/self-drilling, #9 x 25 mm (1 inch), zinc coated steel screws with rubber washer and head color to match panels.

.4 Structural Screws: Self-fastening/self-drilling TEK #1/4-28 zinc-coated steel screws, length same as panel thickness.

.5 Interior Finishing Screws: Self-fastening/self-drilling steel #8 x 19 mm (3/4 inch) zinc-coated screws with head color to match panels.

.6 Anchor Bolts and Nuts: ASME B18.2.2, SAE Gr. 5, minimum 6.6 mm (0.26 inch) diameter

.7 Anchor strip: cut out of gauge 24 steel, the anchor strip of the corner assembly.

.8 Flexible Flashing: Air-barrier type; modified bitumen sheet laminated to protective polyethylene film, self-adhering, 1 mm. (0.040 inch) thick; primer as recommended by manufacturer

.9 Panel Sealant (concealed joint): Synthetic butyl, elastomeric, solvent-free, non-skinning, and compatible with steel surfaces, to CGSB-19-GP-14 M. Sealant to be factory applied.

.10 Flashing Sealant: Exterior type, weather-resistant, compatible with surfaces to be sealed. Elastomeric with chemical polymerization, moisture curing, to CAN/CGSB-19.13, color to match panels.

.11 Interior Sealant: CAN/CGSB-19.13, silicone based mastic [approved by CFIA for use in buildings with food processing/handling facilities]; color to match panels.

.12 Joint Backup: Polyethylene, urethane, neoprene or vinyl compressible closed-cell foam, compatible with primers and sealants. Oversize 30% to 50% to suit joint width.

.13 Air Sealant Foam: CAN/ULC-S710.1, Bead applied, gun foam, one-component polyurethane sealant, flame spread/smoke developed rating of 25/50 as tested to CAN/ULC-S102 or ASTM E84.

.14 Field Touch-up Paint: As recommended by panel manufacturer.

2.05 FABRICATION

.1 Fabricate panels utilizing pressurized-equalized rain screen fabrication (applicable to vertical panel only).

.2 Form sections true to shape, accurate in size, square, and free from distortion or defects.

.3 Form pieces in longest practicable lengths.

.4 Inject steel sheet cavities with polyisocyanurate foam.

.5 Factory seal exposed foam with plastic film to eliminate water infiltration and prevent loss of insulating gas.

.6 Apply butyl sealant to interior and exterior overlaps during production to provide a continuous and uniform bed of sealant to achieve air tightness.

.7 Factory finish sheets to paint manufacturer’s standards.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for composite metal building panel installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 MANUFACTURER'S RECOMMENDATIONS

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation recommendations, product carton installation recommendations and data sheets.

3.03 PREPARATION

.1 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

3.04 INSTALLATION

.1 Install composite metal panel system on walls and soffits to manufacturer's written instructions. Installation shall conform to the approved shop drawings.

.2 The installation must be carried out with care in order not to damage the surfaces and the panels joints. Install the panels, inserting them properly in order to permanently squeeze the concealed sealant to form a regular and waterproof seal.

.3 Protect panel surfaces in contact with cementitious materials, dissimilar metals with insulating coating.

.4 Installation tolerances must be met.

.5 Attach panels to structure without restricting movement caused by design loads and expansion and contraction of assembly.

.6 During installation, ensure they are not subjected to a deflection exceeding the design loads

.7 Coordinate weather tight seal at roof, floor and at junctions with other wall construction Maintain complete continuity of building envelope air barrier, vapour retarder, insulation and rain screen.

.8 Trim panels with flashings; weep holes, transition sheets, flexible flashings and gap-filling insulation to attain specified system performance.

.9 Provide weep holes and vents at each panel joint to drain water infiltrating system to exterior of building.

.10 Provide exposed and concealed flashings with exterior minimum positive 1:12 slope; surfaces to remain free of stagnant water.

.11 Minimize thermal bridging with insulation and backup to prevent direct conduction through envelope.

.12 Do not leave metal sheet flanges unfolded or exposed. Minimize site cutting. Protect exposed surfaces of cuts with paint to match panel color. Ensure site cuts are same quality as shop cuts.

3.05 TOLERANCES

.1 ERECTION TOLERANCES FOR STRUCTURAL SUPPORT

.1 Unless otherwise specified, steel structural support must be erected in accordance with CAS-S16-14 standard.

.2 Tolerance on structural support flatness: 6 mm in 3 m in all directions.

.3 Tolerance on flatness for the structural support contact area with the panel: 1,5 mm in 150 mm.

.4 A survey of the structural support flatness must be done prior to installation.

.2 EDIFICATION TOLERANCES

.1 Width of interior reveal between panel: 5 mm ± 1,5 mm

.2 Tolerance on vertical alignment: 5mm in 6 m

.3 Tolerance on panel flatness: 6 mm in 3 m In all directions.

.4 Tolerance on oil canning and other surface aesthetic issues: 1 mm in 400 mm. Each panel must be individually inspected prior to installation.

3.06 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

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

.2 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.3 Remove excess sealant with recommended solvent.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.07 PROTECTION

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

.2 Repair damage to adjacent materials caused by composite metal building panel installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International Inc.

.1 ASTM C 726-05, Standard Specification for Mineral Fiber Roof Insulation Board.

.2 ASTM C 728-05, Standard Specification for Perlite Thermal Insulation Board.

.3 ASTM C 1177/C 1177M-06, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.4 ASTM C 1396/C 1396M-06a, Standard Specification for Gypsum Board.

.5 ASTM D 41-05, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

.6 ASTM D 312-00(2006), Standard Specification for Asphalt Used in Roofing.

.7 ASTM D 448-03a, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

.8 ASTM D 2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

.9 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

.10 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.11 ASTM D 6164-05, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.12 ASTM D 6222-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.

.13 ASTM D 6223-02e1, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.

.14 ASTM D 6509-00, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.2 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA)

.1 CRCA Roofing Specifications Manual-1997 .

.4 Canadian Standards Association (CSA International)

.1 CSA A123.21-04, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems

.2 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt.

.3 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.4 CSA A231.1-06, Precast Concrete Paving Slabs.

.5 CSA O121-08, Douglas Fir Plywood.

.6 CSA O151-04, Canadian Softwood Plywood.

.5 Factory Mutual (FM Global)
.1 FM Approvals - Roofing Products.

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

.7 Underwriters Laboratories' of Canada (ULC)
.1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/ULC-S702.2-03, Standard for Mineral Fibre Thermal Insulation for Buildings.
.3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.4 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
.1 Provide the most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Provide the WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and indicate VOC content for:
.1 Sealers.

.2 Provide shop drawings:
.1 Indicate flashing details.

.3 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.4 Test and Evaluation Reports: submit laboratory test reports certifying compliance of membrane with specification requirements.

.5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

1.03 QUALITY ASSURANCE

.1 Not Used.

1.04 FIRE PROTECTION

.1 Fire Extinguishers:
.1 ULC labelled for A, B and C class protection.
.2 Size 4.5 kg on roof per torch applicator, within 6 m of torch applicator.

1.05 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Requirements:
.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds,

primers and caulking materials.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.

.4 Remove only in quantities required for same day use.

.5 Place plywood runways over completed Work to enable movement of material and other traffic.

.6 Store sealants at +5 degrees C minimum.

.7 Protect stored insulation.

.

1.06 SITE CONDITIONS

.1 Ambient Conditions

.1 Do not install roofing when temperature remains below -18 degrees C for torch application,

.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.06 WARRANTY

.1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to 120 months.

2 PRODUCTS

2.01 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

2.02 SUPPORT PANEL / VAPOR RETARDER

.1 Panel

.1 Description : panel composed of SBS modified bitumen membrane with a non-woven polyester reinforcement, factory-laminated on a high density mineral fibre (rock wool) board. The surface is sanded and thermofusible

.2 Panel dimensions (m) 0,91 x 4,88

.3 Membrane dimensions (m) – 1 x 4,90

.4 Thickness : 19 mm

.5 R factor – 4 per 25 mm of thickness

.6 Membrane reinforcement – Non woven polyester

.7 Breaking strength, L/T (kN/m) CAN/CGSB-37.56-M,9th edition 17,0 / 12,5

.8 Ultimate elongation ,L/T (%)CAN/CGSB-37.56-M, 9th edition 60 / 65

.9 Cold bending (ºC) CGSB-37.56-M, 9th edition - initial -30

- 90 days at 70ºC -30

.2 Vapour barrier continuity strip

.1 Description : cover strip composed of SBS modified bitumen and a composite reinforcement. Both surfaces are covered with a thermofusible plastic film.

.2 Thickness: 2.5 mm

2.03 INSULATION

.1 Polyisocyanurate insulation

.1 Panel of polyisocyanurate insulation composed of a closed cell structure covered on both faces with a glass-fiber reinforces organic coating. (RSI 1 per 25 mm).

.2 Plan for three panels of 50mm thick

2.04 MEMBRANE

.1 Waterproofing system consisting of SBS modified bituminous membrane with a robust composite reinforcement with a mechanically fastened underlayment and a finishing membrane torch welded. The top surface of the undercoat is covered with a thermofusible film with two marked lines to facilitate the rolls alignment and the placement of the mechanical anchors. The underside of the finishing membrane is covered with a thermofusible film and the top is protected with white slate flakes.

.2 The underlayment has combined longitudinal joints (70% self-adhering, 30% termofusible). The self-adhering section protects the combustible surfaces and the thermofusible provides an efficient waterproofing.

Standard System Characteristics:	Longitudinal	Transversal
Breaking strength (kN/m):	17	16
Resistance to distortion (kN/m):	11	10,5
Ultimate elongation (%):	60	60
Cold bending at – 30 °C:	no cracking	
Compound stability temperature:	≥ 110 °C	
Static puncture resistance (N) :	380	

Conforming to CGSB 37.56-M (9th edition)

.3 Roofing cap membrane for field surface: Roofing membrane composed of SBS modified bitumen with a composite non- reinforcement and elastomeric bitumen with flame-retarding agent. The surface is protected by coloured granules. The underface is covered with a thermofusible plastic film.

.4 In conformance to : ASTM D6162.

Minimal properties :		MD	XD
Peak load at -18 °C ± 2 °C (kN/m)	Initial	25	22
	90 days at 70 °C	26	22
Elongation at -18 ± 2 °C (%)	Initial	43	45
	90 days at 70 °C	33	32
Peak load at 23 °C ± 2 °C (kN/m)	Initial	20	16
	90 days at 70 °C	20	17
Elongation at 23 °C ± 2 °C (%)	Initial	58	60

	90 days at 70 °C		47	53
Tear strength at 23 °C ± 2 °C (%)		Initial	82	80
	90 days at 70 °C		20	17
Tear strength at 23 °C ± 2 °C (N)	690		600	
Low temperature flex (°C)		Initial	-20	-20
	90 days at 70 °C		-18	-20
Dimensional stability, max (%)	0,2		0,1	
Compound stability temparature (°C)	125			

2.05 MEMBRANE ACCESSORIES

.1 Reinforcement membrane composed of SBS modified bituminous membrane with a non-woven polyester reinforcement and of elastomeric bitumen composite Both sides are covered with a thermofusible film

.2 Overlay membrane : membrane composed of SBS modified bituminous membrane with a non-woven polyester reinforcement and of elastomeric bitumen composite Both sides are covered with a thermofusible film. Used to seal transverse overlap.

.3 Flame retardant membrane: a self-adhesive membrane composed of a fiberglass mat and SBS modified bituminen designed to prevent flame penetration into any void, space or opening prior to the laying of a torch welded membrane.

.4 Expansion membrane: waterproofing membrane of expansion joint allowing movement on three directions concurrently, allowing an elongation of 500% at temperatures between -40^{O}C to 40^{O}C. Horizontal movement 50 mm, vertical 19mm and shear 19mm
Thickness: 1.9 mm
Width: 2 900 mm
Weight: 3.66 kg/m2
U. V. resistant.

2.06 PRIMER

.1 Primer for self-adhesive membrane: composed of SBS synthetic rubbers, adhesive resins with volative solvents. Used on porous substrates such as gypsum with fiberglass coating, wood, metal or concrete surfaces in order to improve the adhesion of the self-adhesive membrane at temperatures above -10^{O}C

2.07 FASTENERS

.1 Pre-assembled anchors with # 14 self-tapping cadmium plated screws with flat head,, type A or AB conforming to CSA B35.3 and Factory-Mutual 4470 (rust resistance and tear resistance to winds). FM Approved 50 mm diameter plate assemblies.

.2 Insulation to deck: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer.

.3 Roofing nails: twisted nails with 25mm steel washer and a 3mm diameter rod sufficiently long to penetrate at least 38 mm into the solid wood support, at least 20 mm in plywood panels.

3 EXECUTION

3.01 EXAMINATION OF ROOF DECKS

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual, particularly for fire safety precautions.

.2 Do not begin works before the surfaces are clean, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.3 Prior to beginning ensure:

- .1 Curbs have been built.
- .2 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.02 METHODS OF INSTALLATION

.1 Surface examination and preparation must be completed in conformance with manufacturer’s instructions and recommendations.

.2 Install roofing components on clean and dry surfaces, conforming to manufacturer’s instructions.

.3 Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.

.4 Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.

.5 It’s preferable to seal all seams that are not covered by a cap sheet membrane in the same day. The cap sheet cannot be installed if any moisture is present at/in the base sheet seams.

.6 Ensure waterproofing conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g. vents, drains, etc.).

3.03 SITE PROTECTION

.1 Protect finished work to avoid damage during roof installation and material transportation.

.2 At the end of each work day or when works are interrupted due to bad weather, protect the finished surfaces and the materials that have been moved from the storage area.

3.04 DECK PREPARATION

.1 Install the acoustical insulation in the ribs, conforming to the manufacturer's instructions.

3.05 VAPOUR RETARDER PANELS

.1 Mechanically anchor the panels conforming to manufacturer technical documentation.

.2 All panels must be perfectly juxtaposed, without significant level difference between them and must be well anchored to the deck.

.3 Due to the particularities of this system, it is permissible for this type of vapor barrier to align all joints (no offset) in order to facilitate the positioning of the reinforcing strip.

.4 In order to avoid any infiltration, adhere the first 75 mm of the self-adhesive longitudinal overlaps using a roller and then weld the last 25 mm with a torch. (combined self-adhesive and heat sealed longitudinal joints).

.5 Seal the transversal joints, welding with a torch a strip of 300mm center on the jointl

3.06 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

.1 Insulation: mechanically fastened application:

.1 Mechanically fasten insulation using screws and pressure distribution plates.

.2 Fasten insulation as per manufacturer's written recommendations.

.3 Number and pattern of screws per board to meet Factory Mutual requirements.

.4 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.5 Cut end boards to suit.

.2 Flame Retardant Membrane Installation

.1 Adhere the membrane directly on an approved surface by removing the detachable silicone film. The membrane is designed to prevent the penetration of the flame into any void, space or opening prior to the installation of a torch welded membrane.

.2 Unroll the flame retardant membrane on the insulation, taking care to overlap it to prevent the flame penetration on the insulation.

.3 Base Sheet Application

.1 Unroll the base sheet on the substrate, taking care to align the edge of the first sheet. Leave the membrane in place for 15 minutes before the installation or burn the plastic film, zigzagging with a torch to relax the product. In cold weather it is recommended to use this method.

.2 Secure one end of the underlayment, pull firmly to lay it flat and then install the specified anchors, progressing towards the free end of the sheet. Spacing according to the manufacturers specifications. Install additional anchors at the corners and perimeter of the roof as well as obstacles.

.3 Each edge will overlap the previous one by 100 mm laterally following the marked lines provided for this purpose and 150 mm at the ends. Space cross joints by at least 300mm.

.4 In order to avoid any infiltration, adhere the first 75mm of the self-adhesive longitudinal overlap with a roller, then weld with a torch the last 25 mm (longitudinal joints self-adheres

and thermofusible).

.5 Seal the transverse joints by welding a protective strip of 150 mm centered on the joint.

.6 At the transvers overlap cut at an angle the corner of the zone that will be covered with the next membrane roll.

.7 Special care must be given to prevent the underlay from forming folds or gaps.

.8 Install reinforcement gussets to all internal and external corners.

.4 Base Sheet Flashing Installation

.1 Primer must be dry for base sheet installation

.2 Before applying the membranes, always burn the plastic film pf the part to be covered when there is overlap (inside corner, exterior corner and running surface).

.3 Gradually remove the silicone paper while pressing the membrane with the aluminum applicator to increase the adherence. Use the same applicator to achieve a perfect transition between the vertical and horizontal surface. Pass a roller on the entire surface to achieve a full adhesion.

.4 All transverse overlap, cut to an angle the corner of the area to be covered by the membrane roll.

.5 Install reinforcement gussets to all internal and external corners.

.6 Always seal the overlaps at the end of a work day.

.5 Cap Sheet Application:

.1 After applying the base sheet and ensuring that it has no defects, the cap sheet will be applied.

.2 Use double sided starting cap sheet roll for the edge. If a starting is not used, the longitudinal overlap covered with flakes must be degranulated by pressing those into the heated bitumen with a torch over a width of 75mm.

.3 The cap sheet will be unrolled, making sure to align it with the edge (parallel to the roof edge).

.4 The cap sheet will be welded with the recommended torch by the membrane manufacturer to the base sheet. This application will consist in melting simultaneously the base sheet and the cap sheet so as to fuse the two membranes. Maintain a suitable fusing rate for the membrane to weld.

.5 Make sure not to overheat the membranes and their reinforcement.

.6 Make sure that there is at least 300mm between the joints of the base sheet and the cap sheet.

.7 Overlaps of the cap sheet will be 75 mm along the length and 150 mm for the end joints. At transversal overlaps, cut at the angle the membrane corners to be covered prior to welding. All overlaps should be made without flakes or previously degranulated.

.8 Make sure to completely seal the two membranes and not to leave unwelded areas. Special attention shall be paid tp prevent membrane from forming folds or gaps. In cold wather, adjust the welding speed to obtain a homogenous weld (it may be necessary to diminish the rate according to the weather conditions).

.9 After the installation of the cap sheet, all overlap joints are to be checked.

.10 During installation, special attention must be paid to avoid excessive bitumen smear at joints.

.6 Cap Sheet Application on Flashings:

.1 The cap sheet will be laid out per one meter wide element. The longitudinal overlaps will be 75 mm and will be staggered by at least 100mm from those of the horizontal cap sheet to avoid any extra thickness. The overlaps on the horizontal section will be 50 mm more than

those of the flashings and parapets. At the transverse coverings, cut at an angle the corner of the area that will be covered by the next membrane roll.

.2 Using a chalk line, draw a straight line on the horizontal surface, 150 mm from the parapets.

.3 Using a torch and a rounded trowel, press the flakes into the bitumen layer (from the line drawn along the parapet to the parapet, as well as over the vertical portions to overlap.

.4 This cap sheet will be torch welded directly to the base sheet by proceeding from bottom to top. This application will consist in softening the two membranes to obtain a homogenous weld.

.5 During installation, special attention must be paid to avoid excessive bitumen smear at joints.

3.16 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 DAF-45-R03, Designation System for Aluminum Finishes - 9th Edition.
- .2 ASM-35-October 2000, Specifications for Aluminum Sheet Metal Work in Building Construction, Section 5.

.2 ASTM International
- .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 240/A 240M-11a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A 653/A 653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A 792/A 792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
- .5 ASTM B 32-08, Standard Specification for Solder Metal.
- .6 ASTM B 370-11, Standard Specification for Copper Sheet and Strip for Building Construction.
- .7 ASTM D 523-89(2008), Standard Test Method for Specular Gloss.
- .8 ASTM D 822-01(R2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
- .2 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound.
- .3 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .4 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.4 CSA International
- .1 CSA A123.3-05(2010), Asphalt Saturated Organic Roofing Felt.

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

.6 National Building Code of Canada 2015 (NBC).
- .1 CCMC- Registry of Product Evaluations.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sheet metal roofing and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Proof of manufacturer's CCMC listing and listing number.
- .3 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store material indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect sheet metal roofing from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester.
- .1 Class F1S.
- .2 Colour selected by Departmental Representative from manufacturer's standard range.
- .3 Specular gloss: 30 units +/-5 to ASTM D 523.
- .4 Coating thickness:25 micrometres minimum.
- .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D 822 as follows:
  - .1 Outdoor exposure period 1000 hours minimum.
  - .2 Humidity resistance exposure period 1000 hours minimum.

2.02 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB-37.5.

.3 Underlay: No.15 perforated asphalt felt to CSA A123.3.

.4 Sealant: compatible with systems materials, recommended by system manufacturer.

.5 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.

.6 Cleats: of same material, and temper as sheet metal:50 mm minimum wide.
- .1 Thickness same as sheet metal being secured.

.7 Fasteners: exposed.

.8 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.9 Touch-up paint: as recommended by sheet metal roofing manufacturer.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sheet metal roofing installation in accordance with

manufacturer's written instructions.

.1 Visually inspect substrate.
.2 Identify the areas where sheet metal roofing is to replace and confirm quantities (PLAN 50 M2 for the tender, confirm quantities before the sea lift).
.3 Examine all anchors and washer seals.
.4 Inform Departmental Representative of locations and areas to replace upon discovery.
.3 Proceed with installation only after receipt of written approval to proceed from Departmental Representative.

3.02 INSTALLATION

.1 Each existing anchor must be checked, tightened or replaced, depending on the condition, including the sealing washer
.2 Where the metal sheets are to be replaced, include an intermediate sheet under the metal sheet. Secure it and make overlapping joints over at least 200 mm.
.3 Fasten with anchors and make overlapping joints over at least 150 mm in the direction of flow.
.4 Lay metal sheets or metal sheets using fasteners arranged similarly to the existing ones.
.5 Stagger the transverse joints of the contiguous sheets.
.6 Flash roof penetrations with material matching roof panels, and make watertight.
.7 Form seams in direction of water-flow and make watertight.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by sheet metal roofing installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 167-99(2004), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 240/A 240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A 606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
- .4 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A 792/A 792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .6 ASTM B 32-04, Standard Specification for Solder Metal.
- .7 ASTM B 370-03, Standard Specification for Copper Sheet and Strip for Building Construction.
- .8 ASTM D 523-89(1999), Standard Test Method for Specular Gloss.
- .9 ASTM D 822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.2 Canadian Roofing Contractors Association (CRCA)
- .1 Roofing Specifications Manual 1997.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.4 Canadian Standards Association (CSA International)
- .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
- .2 AAMA/WDMA/CSA 101/I.S.2/A440-2008, Standard/Specification for Windows, Doors, and Unit Skylights.
- .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit shop drawings as required.

.4 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

2 PRODUCTS

2.01 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester.
.1 Class F1S
.2 Colour selected by Departmental Representative from manufacturer's standard range.
.3 Specular gloss: 30 units +/- 5 in accordance with ASTM D 523.
.4 Coating thickness: not less than 25 micrometres.
.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5units or less and erosion rate less than 20 % to ASTM D 822 as follows:
.1 Outdoor exposure period 1000 hours.
.2 Humidity resistance exposure period 1000 hours.

2.02 ACCESSORIES

.1 Nails: conforming to CSA B11, flat head, roofing nails , length and gauge appropriate toe the metal used, better suited for the metal used and preventing galvanic corrosion of different metals.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.

.4 Sealants conforming to CAN2 19.13 M82

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide.

.6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.

2.03 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and as indicated.

.2 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

2.04 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated galvanized prefinished steel.

2.05 EAVES TROUGHS AND DOWNPIPES

.1 Form eaves troughs and downpipes from galvanized prefinished.

.2 Sizes and profiles as indicated.

.3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION

.1 Install sheet metal work as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
- .1 Secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
- .1 Flash joints using S-lock forming tight fit over hook strips, as detailed.

.5 Lock end joints and caulk with sealant.

.6 Caulk flashing at reglet cap flashing with sealant.

.7 Install pans, where shown around items projecting through roof membrane.

3.03 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 750 mm on centre with eaves trough spikes through spacer ferrules.
- .1 Slope eaves troughs to downpipes as indicated.

.2 Install downpipes and provide goosenecks back to wall.
- .1 Secure downpipes to wall with straps at 1200 mm on centre; minimum two straps per downpipe.

.3 Install splash pans as indicated.

3.04 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

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

.2 National Research Council Canada (NRC)
- .1 National Building Code of Canada 2015 (NBC).

.3 Underwriter's Laboratories of Canada (ULC)
- .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

1.02 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: NBC Part 3.1.9.1(1) and 9.10.9.6(1)): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
- .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets .

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
- .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
  - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
- .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product

Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended .

.2 Fire stop system rating: 1 hour.

.2 Service penetration assemblies: systems tested to CAN-ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

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

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

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

.10 Sealants for vertical joints: non-sagging.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation.

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

3.03 INSTALLATION

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

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

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

.4 Tool or trowel exposed surfaces to neat finish.

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

3.04 SEQUENCES OF OPERATION

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

.2 Install floor fire stopping before interior partition erections.

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

.4 Mechanical pipe insulation: certified fire stop system component.

.1 Ensure pipe insulation installation precedes fire stopping.

3.06 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.08 SCHEDULE

.1 Fire stop and smoke seal at:

.1 Penetrations through fire-resistance rated partitions and walls.

.2 Openings and sleeves installed for future use through fire separations.

.3 Around mechanical and electrical assemblies penetrating fire separations.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)
- .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

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

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Manufacturer's product to describe:
  - .1 Caulking compound.
  - .2 Primers.
  - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.03 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

1.06 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Proceed with installation of joint sealants only when:
  - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
  - .2 Joint substrates are dry.
  - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:
- .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
- .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

2 PRODUCTS

2.01 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only these primers.

2.02 SEALANT MATERIAL DESIGNATIONS

.1 Primers of the type recommended by the manufacturer of the sealant.
.2 Backing : compatible with the primeres and sealants, 30% to 50% oversized.

.1 Polyethylene, cellular foam with closed cells. Such as SofRod from Tremco or Ethafoam from Dow or equivalent approved. Seal bottoms must be approved by the manufacturer of the sealant

.3 Non-stick product: plastic tape with single-sided bonding, which does not adhere to waterproofing products.

.4 Sealants must be on the list of approved products, prepared by the CGSB's Sealants Certification Board. For sealants that have been sealed Approved with a primer, only this primer must be used with the sealant

.1 Sealant, type 1: multi-component urethane, conforming to CAN / CGSB-19.24-M90 type 2 category B, chosen by the Departmental representative from the full range of colors offered by the manufacturer.

.2 Sealant, type 2: multi-component urethane based, conforming to CAN / CGSB-19.24-M90 type 1 category B, self-leveling, chosen by the Departmental representative from the full range of colors offered by the maker.

.3 Sealant, type 3: according to CAN / CGSB-19.17-M90, based on siliconized latex, chosen by the Departmental representative from the manufacturer's standard range.

.4 Silicone sealant, type 4 according to CAN / CGSB-19.22-M89, with incorporated fungicide, chosen by the Departmental representative from the manufacturer's standard range

.5 Sealant, type 5: according to CAN / CGSB-19.13-M87, based on silicone, color of the choice of the Departmental representative.

.5 Joint cleaner: xylol, methylethylcetone or non-corrosive product recommended by the manufacturer of the sealant and compatible with the materials forming the joint

2.03 SEALANT SELECTION

.1 Apply sealants according to the following instructions, as well as at the locations shown in the drawings. Refer to the related sections for sealants installed by these sections. Apply sealant any other place indicated below when this caulking is not provided for in other sections.

.2 Type 1: use outdoors for all joints separating steel door frames and adjacent building elements, around the perimeter of each opening or opening to the exterior of the wood and brick facings, for the expansion joints and openings in brick and wood cladding and similar places.

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.3 Type 2: for horizontal joints exposed to traffic, such as joints in concrete slabs and floor control joints

.4 Type 3 for indoor use around door frames, windows, interior control seals and between two adjacent elements. To be used indoors where the sealer must be painted; In general, this caulking is planned for gypsum works.

.5 Type 4: for use indoors, in wet areas and requiring resistance to mildew.

.6 Type 5: for use outdoors, in sheet metal work and inside around counters and vanities backsplashes.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other

Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.03 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.04 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.05 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.06 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

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

.2 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

3.07 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.08 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM B 29-03, Standard Specification for Refined Lead.
- .3 ASTM B 749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.

.3 Canadian Standards Association (CSA International)
- .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

.5 National Fire Protection Association (NFPA)
- .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
- .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
- .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.02 SYSTEM DESCRIPTION

.1 Design Requirements:
- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
- .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 for ratings specified or indicated.
- .4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E 152 and listed by nationally recognized agency having factory inspection services.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvred, arrangement of hardware and fire rating and finishes.
- .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.
- .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .4 Submit test and engineering data, and installation instructions.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Manufacturer's recommendations.

2 PRODUCTS

2.01 MATERIALS

.1 Hot-dip galvanized steel sheet: tension-tensile steel with the following characteristics:
- .1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts, galvanized minimum – 75 g/m2. In accordance with ASTM A924M and ASTM A653M, for interior door and frame components

- .2 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts. , galvanized minimum – 275 g/m2. In accordance with ASTM A924M and ASTM A653M, for interior door and frame components

.2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75, 3 mm thickness coated:
- .1 f a zinc / iron alloy layer of at least 75 g / m2 (designation ZF75), for the reinforcement of the interior doors and frames;
- .2 f a zinc / iron alloy layer of at least 275 g / m2 (designation ZF75), for the reinforcement of the exterior doors and frames;

2.02 DOOR CORE MATERIALS

.1 Honeycomb construction:
- .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m2 minimum sanded to required thickness.

.2 Stiffened: face sheets laminated insulated core.
- .1 Polyurethane: to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/mü.

.3 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250 degrees C at 30 or 45 minutes. Core to be tested as part of a complete door

assembly, in accordance with CAN4-S104, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.

2.03 ADHESIVES

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

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

2.04 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.

2.05 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

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

.4 Fire labels: metal riveted.

.5 Glazing: see section 08 80 50

.6 Make provisions for glazing as indicated and provide necessary glazing stops.
- .1 Provide removable steel glazing beads for use with glazing tapes and compounds and secured with countersunk steel screws.
- .2 Design exterior glazing stops to be tamperproof.

2.06 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Exterior frames: 1.6 mm welded, thermally broken type construction.

.4 Interior frames: 1.6 mm welded type construction.

.5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.6 Protect mortised cutouts with steel guard boxes.

.7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.8 Manufacturer's nameplates on frames and screens are not permitted.

.9 Conceal fastenings except where exposed fastenings are indicated.

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

fabrication.

.11 Insulate exterior frame components with polyurethane insulation.

2.07 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

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

2.08 FRAMES: WELDED TYPE

.1 All frames to be welded.

.2 Welding in accordance with CSA W59.

.3 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.4 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.5 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.6 Securely attach floor anchors to inside of each jamb profile.

.7 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.09 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Exterior doors: honeycomb construction. Interior doors: honeycomb construction.

.3 Fabricate doors with longitudinal edges welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.4 Blank, reinforce, drill doors and tap for mortised, templated hardware.

.5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.6 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

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

.8 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104 and list by nationally recognized agency having

factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.9 Manufacturer's nameplates on doors are not permitted.

2.10 DOORS: HONEYCOMB CORE CONSTRUCTION

.1 Form face sheets for exterior doors from 1.6 mm sheet steel with insulated core laminated under pressure to face sheets.

.2 Form face sheets for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.11 THERMALLY BROKEN DOORS AND FRAMES

.1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.

.2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate thermally broken frames separating exterior parts form interior parts with continuous interlocking thermal break.

.4 Apply insulation.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.03 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

.6 Maintain continuity of air barrier and vapour retarder.

3.04 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.

.1 Hinge side: 1.0 mm.

.2 Latchside and head: 1.5 mm.

.3 Finished floor and thresholds: 13 mm.

.3 Adjust operable parts for correct function.

.4 Install louvres.

3.05 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.06 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 - Glazing.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A 1008/A 1008M-10, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- .2 ASTM D 523-08, Standard Test Method for Specular Gloss.
- .3 ASTM D 822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.105-M91, Quick-Drying Primer.
- .2 CAN/CGSB-1.213-04, Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminum.
- .3 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coatings.

.3 CSA International
- .1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for doors, hardware, and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:
- .1 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, required clearances and electrical connections.

.3 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.03 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for sectional metal doors for incorporation into manual.

1.04 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Spare parts:
- .1 Supply spare parts for sectional metal doors as follows:
  - .1 Door panels: 1
  - .2 Door rollers: 4
  - .3 Weatherstripping: 1 set
  - .4 Springs and cables: 1 set

.2 Store where directed. Identify each part and reference to appropriate door.

1.05 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect sectional metal doors, hardware and accessories from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 DESIGN CRITERIA

.1 Design exterior door assembly to withstand wind load of 1 kPa with a maximum horizontal deflection of 1/240 of opening width.

.2 Design door panel assemblies with thermal insulation factor 5.71 RSI.

.3 Design door assembly to withstand minimum 15 000 cycles per annum, and 15 years total life cycle.

2.02 MATERIALS

.1 Galvanized steel sheet: commercial quality, with zinc plating ASTM A525 G90, commercial grade, conforming to ASTM A 526, 1.42 mm (inside and outside).
.2 Rails: steel according to ASTM A 526, caliber 2.5 mm, 75 mm
.3 Support plate: steel in accordance with ASTM A 526, thickness 3.4 mm:
.4 Door rollers: steel in accordance to ASTM A 526, thickness 2.1 mm
.5 Hinges: steel in accordance to ASTM A 526, thickness 2.9 mm
.6 Thermal insulation: CFC and HCFC-free polyurethane with a minimum density of 41 kg / m3, RSI value of 5.64 per 100 mm thickness
.7 Glazing: rectangular frame with thermo glass 3 mm x 3mm; 305 mm x 915 mm:
.8 Cables: stranded cables, of galvanized steel, of aircraft type

2.03 DOORS

.1 Fabricate 100 mm thick insulated flush panel doors of as indicated.

.2 Core of panels made of rigid polyurethane foam injected under pressure between two lining sheets

.3 Internal reinforcement plate of 0.86 mm thickness to support the solid attachment of the intermediate hinges
.4 Seal: Cold-rolled steel sheet in a male-female spliced joint forming a 68 mm thermal break and double-bubble shaped weather stripping.
.5 Perimeter weather-stripping: flexible PVC with triple lip retained by an extra-strong aluminum profile.
.6 Bottom weather-stripping: U-shaped flexible PVC, retained by an extra-strong aluminum profile secured to the bottom of the door.
.7 Panels workshop painted, system with primer and two coats of finish, acrylic urethane, dry film of 5 mils.

2.04 HEAVY DUTY INDUSTRIAL HARDWARE

.1 Guide rails: rails of 75 mm vertical and horizontal, galvanized steel. The vertical rails are tilted, for a impervious closure.
.2 Continuous vertical angle: galvanized and cold-formed galvanized steel angle 2.50 mm thick, welded to vertical and horizontal rails for maximum rigidity.
.3 Rollers: rollers are 75 mm in diameter, made of hardened steel with steel ball bearings 6 mm in diameter. The roller axle is made of cold-rolled steel. The long axle rollers are supplied with double hinges or double roller carriers.
.4 Hinges: in galvanized steel of 2.10 mm caliber with gradation to ensure the water tightness to the jambs. Double end hinges.
.5 Upper roller carriers: are made of 2,10 mm caliber galvanized steel, adjustable, to allow door adjusting at the head lintel for a better seal.
.6 Lower corner support; galvanized steel, 2.5 mm thick
.7 Counter-balance with torsion springs: helical type, oil-hardened and designed for a total number of maneuvering cycles (opening / closing), during their useful life. Capacity of 10,000 cycles.
.8 Drums: are made of high-pressure cast aluminum alloy. Each drum will have a special attachment location for the cable. The cable is adjustable by means of a nut on the free side of the drum.
.9 Cables: galvanized steel, aircraft type, construction 7 x 19 with a safety factor for an operating frequency of at least 10,000 cycles.
.10 Shaft: 25 mm diameter solid rod, made of cold rolled steel, receiving drums, couplings and other accessories as required.
.11 Rail guard: Z-shaped, 1524 mm high, made of 5 mm thick steel plate.
.12 Launch springs keeping the cable continuously under tension by pushing the panel from top to bottom.
.13 Security corner bracket: braking and blocking the fall of the door in the event of cable breakage.
.14 Safety system for springs, braking the fall of the door in case of spring breakage.

2.05 ELECTRICAL OPERATOR

.1 Electric door openers: with control shaft, laterally mounted

.2 Electric motors, control devices, remote control unit with surface mounted push-buttons, "OPEN-STOP-CLOSE", relays and other electrical equipment: CSA approved, in Nema 4 housing.

.3 Motor : 1 HP, 240 V, single phase, 60hz, ultra heavy duty
- .1 Heavy duty reversing contactor c/w mechanical and electrical interlock
- .2 Continuous duty Industrial motor
- .3 Heavy duty 5L V-belt
- .4 19 mm cast iron flange on pulley shaft
- .5 25 mm cast iron flange bearing on drive shaft
- .6 24 V fused control circuit
- .7 C2 wiring standard (constrant pressure close)
- .8 External radio control termination strip
- .9 Fully adjustable rotary limit switches
- .10 Pwoder metal limit cams
- .11 Motor removable without affecting limit setting
- .12 Adjustable friction clutch
- .13 Solenoid brake standard
- .15 # 50 roller chain drive and sprockets
- .16 Chain guard
- .17 Emergency chain hoist with electrical cut-out switch for manual operation

.4 Controller units:
- .1 Remote control unit with surface mounted push-buttons "OPEN-STOP-CLOSE"

.5 Safety switch: Assembly of contactors concealed in a rubber contact bar placed at the bottom of the doors and over its entire width; In the presence of an obstacle, this device causes the door to be stopped and immediately lifted.

.6 Door speed: 300 mm per second.

.7 Control transformer: for 24 VAC control voltage.

.8 Mounting brackets: galvanized steel, size and gauge to suit conditions.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for sectional metal doors installation in accordance with manufacturer's written instructions.
- .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install doors and hardware in accordance with manufacturer's instructions.
.3 Rigidly support rail and operator and secure to supporting structure.
.4 Touch-up steel doors with primer where galvanized finish damaged during fabrication.
.5 Install operator including electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation.
.6 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.
.7 Adjust weatherstripping to form a weather tight seal.
.8 Adjust doors for smooth operation.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleanin.
  .1 Remove traces of primer; clean doors and frames.
  .2 Clean glass and glazing materials with approved non-abrasive cleaner.

3.04 PROTECTION

,
.1 Protect installed products and components from damage during construction.
.2 Repair damage to adjacent materials caused by sectional metal door installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM A 123/A 123M-12, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E 1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.3 CSA Group
- .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .3 CAN/CSA-A440.4-07(R2012), Window, Door, and Skylight Installation
- .4 CAN/CSA-A440.2/A440.3-09, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
- .5 CAN/CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
- .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.

.4 Screen Manufacturers Association (SMA)
- .1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for windows and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:
- .1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, elevations of unit, anchorage details, location of isolation coating, description of related components, fasteners, and caulking. Indicate location of manufacturer's nameplates.

.3 Test and Evaluation Reports:
- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
- .2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
  - .1 The product manufacturer.
  - .2 The type of product.
  - .3 The model number/series number.
  - .4 The primary product designation.

.5 The secondary product designation.
.1 Positive design pressure.
.2 Negative design pressure.
.3 Water penetration resistance test pressure.
.4 Canadian air infiltration and exfiltration levels.
.6 The test completion date.
.3 The report will also contain the following information:
.1 Test dates.
.2 Report preparation dates.
.3 Test information retention period.
.4 Location of testing facilities.
.5 Full description of test samples, including:
.1 Enamelled finish, weathering characteristics.
.2 Condensation resistance.
.3 Safety drop - vertical sliding windows only.
.4 Block operation - sliding windows only.
.5 Sash strength and stiffness - operable casement.
.6 Sash pull-off - vinyl windows.
.7 Forced entry resistance.
.8 Mullion deflection - combination and composite windows.
.6 Complete description of amendments, as applicable.
.7 Conclusion.
.8 Drawings signed by the testing laboratory, if provided.

1.03 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect windows from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 All windows by same manufacturer.

.3 Sash: aluminum thermally broken.

.4 Main frame: aluminum thermally broken.

.5 Glass: Sealed unit, triple glazed of a total thickness of 30 mm, tempered glass, 2 LOW-E films and argon

.6 Screens: to ASTM E 1748 on the ventilating portion of the windows.
- .1 Colour: black
- .2 Insect screening mesh: count 18 x 16 / 25 mm square.
- .5 Fasteners: tamper proof.
- .6 Screen frames: steel aluminum vinyl colour to match window frames.
- .7 Mount screen frames for interior replacement.

.7 Isolation coating: alkali resistant bituminous paint.

2.02 WINDOW TYPE AND CLASSIFICATION

.1 Product types:
- .1 C - Casement window.

.2 Classification rating: to AAMA/WDMA/CSA 101/I.S.2/A440.
- .1 Primary designation:
  - .1 Performance classes: CW and A3, B7, S1, C5 and F20

2.03 FABRICATION

.1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed are maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with 380 g/mý zinc coating to ASTM A 123/A 123M.

2.04 ENAMEL COATING

.1 Enamel coating: in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, including appendices, supplemented as follows:
- .1 Standard colour, see drawings

2.05 ISOLATION COATING

.1 Coatings: in accordance with manufacturer's recommendations for surface conditions.

.2 Isolate aluminum from following components, by means of isolation coating:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

2.06 GLAZING

.1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.07 HARDWARE

.1 Hardware: stainless steel or white bronze sash locks and aluminum handles to provide security and permit easy operation of units.

.2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
- .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 INSTALLATION

.1 Window installation:
- .1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

.2 Sill installation:
- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces.
- .2 Cut sills to fit window opening.
- .3 Secure sills in place with anchoring devices located at ends joints of continuous sills and evenly spaced 600 mm on centre in between.

.3 Caulking:
- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Departmental Representative.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by window installation. **END OF SECTION**

1 GENERAL

1.01 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)

.1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
.2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
.3 ANSI/BHMA A156.3-2001, Exit Devices.
.4 ANSI/BHMA A156.4-2000, Door Controls - Closers.
.5 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
.6 ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
.7 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
.8 ANSI/BHMA A156.18-2006, Materials and Finishes.

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
.1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Hardware List:
.1 Submit contract hardware list.
.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.03 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.04 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:
.1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Tools:
.1 Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.

1.05 QUALITY ASSURANCE

.1 Regulatory Requirements:
- .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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

1.06 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:
- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect door hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping or strippable coating.
- .4 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

.02 DOOR HARDWARE

.1 Locks and latches:
- .1 Interconnected locks and latches: to ANSI/BHMA A156.12, series 5000 interconnected lock, grade 1, designed for function as stated in Hardware Schedule.
- .2 Roses: round.
- .3 Normal strikes: box type, lip projection not beyond jamb.
- .4 Cylinders: key into keying system.
- .8 Finished to 626.

.2 Butts and hinges:
- .1 Butts and hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.

.3 Exit devices: to ANSI/BHMA A156.3, function 08, grade 2, modern design, finished to 626.

.4 Door Closers and Accessories:
- .1 Door controls (closers): to ANSI/BHMA A156.4, designated by letter C and numeral identifiers listed in Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1, finished to 626.
- .2 Door controls - overhead holders: to ANSI/BHMA A156.8, designated by letter C and numeral identifiers listed in Hardware Schedule.

.3 Closer/holder release devices: to ANSI/BHMA A156.15, designated by letter C and numeral identifiers listed in hardware schedule.

.4 Door co-ordinator: surface for pairs of doors with overlapping astragal.

.5 Auxiliary locks and associated products: to ANSI/BHMA A156.5, class 2, function EO141, finished to 626..

.6 Architectural door trim: to ANSI/BHMA A156.6, finished to 626.

.1 Door protection plates: kick plate, 1.27 mm thick stainless steel, height 200 mm x door width.

.7 Flush bolt, to ANSI/BHMA A156.16, LO4351, finished to 626

.8 Auxiliary hardware: to ANSI/BHMA A156.16, finished to 626.

.1 Door stop, wall mounted

.2 Door stop, floor mounted.

.9 Thresholds: 125 mm wide x full width of door opening, extruded aluminum, serrated surface, with thermal break of rigid PVC.

.10 Weatherstripping:

.1 Head and jamb seal:

.1 Extruded aluminum frame and solid closed cell neoprene, clear anodized finish.

.2 Adhesive backed neoprene material.

.2 Door bottom seal:

.1 Extruded aluminum frame and closed cell neoprene sweep, clear anodized finish.

2.03 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.05 KEYING

.1 Supply keys in 5 for every lock in this Contract.

.2 Supply 3 master keys for each master key or grand master key group.

.3 Stamp keying code numbers on keys and cylinders.

3 EXECUTION

3.01 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.6 Use only manufacturer's supplied fasteners.

.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.02 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.3 Remove protective material from hardware items where present.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.05 SCHEDULE

.1 **Groupe 01**

.1 Three (3) hinges A5111, BI, 114 mm x 101 mm, 630.

.2 One (1) exit device 630.

.3 One (1) door closer C02021

.4 One (1) weather stripping kit

.5 One (1) Threshold

.6 One (1) door stop (wall mounted)
.7 One (1) kick plate

.2 **Groupe 02**
.1 Three (3) hinges A5111, BI, 114 mm x 101 mm, 630.
.2 One (1) Interconnected lock, F81, 630
.3 One (1) door stop (wall mounted)
.4 Two (2) kick plate

.3 **Groupe 03**
.1 Six (6) charnières A5111, BI, 114 mm x 101 mm, 630.
.2 One (1) Interconnected lock, F86, 630
.3 Two (2) verrous encastrés
.4 Two (2) door stops (wall mounted)
.5 Four(4) kick plates

END OF SECTION

Project 87101

R079464001

Floor: GROUND FLOOR

Doors and frames schedule

DOORS											FRAMES AND ARCHES						PARTITIONS		
No	**From**	**To**	**Elev.**	**Mat**	**Hand**	**B (width)**	**A (height)**	**Thick**	**Glass**	**Sill**	**Elev.**	**C (width)**	**D (height)**	**Mat**	**Hard**	**ULC**	**Type no.**	**P (Thick)**	**REMARKS**
100.1	EXT	100																	Porte de garage existante
100.2	EXT	100	D1	IS	RR	915	2134	45	VD	*				IS	1				Cadre existant
100.3	100	110	D2	S	L	915	2134	45	VT	*	F2	915	2134	S	2				
100.4	EXT	100	D1	IS	RR	915	2134	45	VD	*				IS	1				Cadre existant
102.1	100	102	D2	S	RR	915	2134	45	VT		F2	915	2134	S	2		HH3IHH		
102.2									VT		F3	967	2134	S					Modification cadre existant
103.1	100	103	D3	S	RR	915	2134	45			F2	1300	2134	S	3		HH3IHH		
103.2	100	103	D3	S	RL	385	2134	45			F2			S			HH3IHH		
105	100	105	D2	S	R	915	2134	45	VT		F2	915	2134	S	2		HH3IHH		
110.1	EXT	110	D1	IS	RL	915	2134	45	VD	*	F1	915	2134	IS	1		W2		
200.1	EXT	200	D4	IS		6205	4370												Porte de garage
200.2	EXT	200	D4			6205	4370												Porte de garage
200.3	EXT	200	D4			5955	4370												Porte de garage
200.4	EXT	200	D4			5955	4370												Porte de garage
300.1	EXT	300																	Porte de garage existante
300.2	EXT	300																	Porte de garage existante
300.3	EXT	300																	Porte de garage existante
300.4	EXT	300																	Porte de garage
300.5	EXT	300	D1	IS	RR	915	2134	45	VT	*				IS	1				Cadre existant
300.6	EXT	300	D1	IS	RR	915	2134	45	VT	*				IS	1				Cadre existant

GENERAL NOTES:

ALL DIMENSIONS TO BE VERIFIED ON SITE.
FOR HARDWARE SEE TRILLIUM LIST.

DOORS AND FRAMES LEGEND

DOORS

W: Wood solid core door - maple wood veneer clear finish (to match sample by designer)

BBS: Base building standard

G: Glass

AL: Aluminium

IS: Isolated steel

HAND

Revol: Revolving door

L: Left Hand

R: Right Hand

RL: Reverse Left Hand

S: Sliding door

RR: Reverse Right Hand

L/R: Left Hand / Right Hand

RL / RR: Reverse Left Hand / Reverse Right Hand

GLASS

C: Clear Glass

T: Tempered Glass

GL1: 1/4" clear tempered glass

GL2: 3/8" clear tempered glass

FRAMES AND ARCHES

BBS: Base building standard

W: MDF W/Maple veneer clear finish

S: Steel

SFR: Steel fire rated

IS: Isolated steel

Ex.: Existant

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 542-05, Standard Specification for Lock-Strip Gaskets.
- .2 ASTM D 790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .3 ASTM D 2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
- .4 ASTM E 84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .5 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-M90, Verre de sécurité trempé ou feuilleté.
- .2 CAN/CGSB-12.2-M91, Verre à vitres plat et clair.
- .3 CAN/CGSB-12.11-M90, Verre de sécurité armé.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit manufacturer's instructions, printed product literature and data sheets for glass and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.04 AMBIENT CONDITIONS

.1 Ambient Requirements:
- .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
- .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

2 PRODUCTS

2.01 MATERIALS

.1 Flat Glass:
- .1 Safety glass: to CAN/CGSB-12.1, transparent, 6 mm thick.
  - .1 Type -tempered
  - .2 Class B-float.
  - .3 Category 1

.2 Insulating glazing

.1 Insulated glazing (VD): to CAN/CGSB-12.8, double glazed of a total thickness of 25mm

.1 Glass: to CAN/CGSB-12.3

.2 Glass thickness: 6mm per pane

.3 Air cavity: 13mm and exterior pane with low thermal conductivity spacer.

.4 Inert gas cavity: filled with argon

2.02 ACCESSORIES

.1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D 2240, length of 25 mm for each square metre of glazing to suit glazing method, glass light weight and area.

.2 Spacer shims: neoprene, 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.3 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour.

.4 Glazing clips: manufacturer's standard type.

.5 Lock-strip gaskets: to ASTM C 542.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.03 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.05 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 1396/C 1396M-09a, Standard Specification for Gypsum Wallboard.
- .2 ASTM C 475/C 475M-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .3 ASTM C 514-04(2009)e1, Standard Specification for Nails for the Application of Gypsum Board.
- .4 ASTM C 645-09a, Standard Specification for Nonstructural Steel Framing Members.
- .5 ASTM C 754-09a, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .6 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
- .7 ASTM C 954-10, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.122 in. (2.84 mm) in Thickness.
- .8 ASTM C 1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .9 ASTM C 1047-10, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .10 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum, framing, sealants and include product characteristics, performance criteria, physical size, finish and limitations.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.
- .3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
- .4 Store and protect partition materials from nicks, scratches, and blemishes.
- .5 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 Non-structural Metal Framing:

- .1 Non-load bearing channel stud framing: to ASTM C 645, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
- .2 Floor and ceiling tracks: to ASTM C 64 , in widths to suit stud sizes, 32 mm flange height.
- .3 Metal channel stiffener: 19 x 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.2 Gypsum Board:

- .1 **Standard panels:** conform to ASTM C 36 and CSA A82.27.M91, of ordinary type, of minimum thickness shown in the drawings, 1220 mm in width and maximum working length, with squared edges at the ends and rounded edges and Beveled on the sides. For concealed layers of gypsum board only, **G** on drawings
- .2 **Heavy-duty panels**: reinforced with cellulose, minimum thickness indicated in the drawings, 1220 mm wide and maximum working length, with squared edges at the ends and rounded edges and beveled edges on the sides. For exposed layers of gypsum board only, **Y** on drawings.
- .3 **Panels type X:** conforming to ASTM C 36 and CSA A82.27.M91, type X, of minimum thickness as shown in the drawings, 1220 mm in width and maximum working length, with squared edges at the ends and rounded edges And bevelled on the sides. For concealed layers of gypsum board only. **X** to the drawings.
- .4 **Ultra-resistant X-type panels**: Type X, minimum thickness shown in the drawings, 1220 mm width and maximum working length, with squared edges at the ends and rounded edges and beveled edges on the sides. For exposed layers of gypsum board only, **H** to drawings.
- .5 **Shaft wall panels**: in fiberglass mat with a non-combustible gypsum core resistant to water and mold, ULC-certified, double bevel edges. 25 mm in thickness, 610 mm in width and in maximum lengths, **C** on the drawings.
- .6 **Ceiling panels:** conform to ASTM C 36 and CSA A82.27.M91, of minimum thickness as shown in the drawings, 1220 mm in width and maximum working length, with squared edges at the ends and rounded and beveled edges on the Sides.

.3 Steel drilling screws: to ASTM C 1002

.4 Laminating adhesive: as recommended by the manufacturer, asbestos free

.5 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, metal, one piece length per location

.6 Acoustic sealants: in accordance with Section 07 92 00 - Joint Sealants

.7 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.

.8 Joint compound: to ASTM C475, asbestos free.

.9 Acoustical insulation: rockwool batt insulation of appropriate width and thickness to reach the prescribed STC.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to partition installation.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 ERECTION OF FRAMING

.1 Install steel framing members to receive screw-attached gypsum board in accordance with ASTM C 754 except where specified otherwise.

.2 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.3 Place studs vertically at 400 mm on centre and maximum of 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.6 Include two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.7 Install heavy gauge single jamb studs at openings.

.8 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.9 Include 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.10 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.11 Extend partitions to ceiling height except where indicated.

.12 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use double track slip joint.

.13 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.14 Install insulating strip under studs and tracks around perimeter of sound control partitions.

3.03 ERECTION OF GYPSUM BOARD AND ACCESSORIES

.1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.

.2 Frame with furring channels, perimeter of openings for access panels.

.3 Install acoustical insulation and sealant in sound rated partitions to correspond with tested assembly.

.4 Install gypsum boards in direction that will minimize number of end-butt joints. Stagger end joints 250 mm minimum.

3.04 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Apply layer gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

3.05 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre using contact adhesive for full length.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install access doors to electrical and mechanical fixtures specified in respective sections.
  .1 Rigidly secure frames to furring or framing systems.

.6 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.7 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.8 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.9 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.06 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.07 PROTECTION

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

.2 Repair damage to adjacent materials caused by partition installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 635/C 635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .2 ASTM C 636/C 636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .3 ASTM E 1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

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

.4 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for ceiling panels and ceiling suspension system and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit duplicate full size samples of each type acoustical units.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors and in accordance with manufacturer's recommendations.
- .2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.
- .3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
- .4 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 COMPONENTS

.1 Acoustic units for suspended ceiling system: to ASTM E 1264
- .1 Fiberglass panels with a vinyl sheet finish
- .2 Tyoe : XII, form 1, motif RC
- .3 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
- .4 Smoke developed 50 or less in accordance with CAN/ULC-S102.
- .5 Noise Reduction Coefficient (NRC) designation of : 0,70
- .6 Light Reflectance (LR) range of 0.72 to ASTM E 1477.
- .7 Edge type square.
- .8 Colour white.
- .9 Size 1220 x 610 x 16 mm thick.
- .10 Shape flat.

.2 Acoustical Suspension:
- .1 Intermediate duty system to ASTM C 635.
- .2 Basic materials for suspension system: commercial quality cold rolled steel, zinc coated.
- .3 Suspension system: non fire rated, two directional exposed tee bar grid.
- .4 Exposed tee bar grid components: shop painted satin sheen, white colour. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
- .5 Hanger wire: galvanized soft annealed steel wire, 3.6 mm diameter for access tile ceilings.
- .6 Hanger inserts: purpose made.
- .7 Carrying channels: 38 x 24 mm channel, of 6 mm thick galvanized steel.
- .8 Accessories: splices, clips, wire ties, retainers and wall moulding flush reveal, to complement suspension system components, as recommended by system manufacturer.

.3 Performance/Design Criteria:
- .1 Maximum deflection: 1/360th of span to ASTM C 635 deflection test.

2.02 ACCESSORIES

.1 Touch-up paint: in accordance with manufacturer's recommendations for surface conditions:

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to acoustical ceiling installation.
- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 INSTALLATION

.1 Installation: in accordance with ASTM C 636 except where specified otherwise.

.2 Suspension System:
- .1 Secure hangers to overhead structure using attachment methods as indicated.
- .2 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
- .3 Lay out centreline of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width.
- .4 Install wall moulding to provide correct ceiling height.
- .5 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles and speakers.
- .6 Support at light fixtures with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .7 Interlock cross member to main runner to provide rigid assembly.
- .8 Ensure finished ceiling system is square with adjoining walls and level within 1:1000.

.3 Acoustic Panels:
- .1 Install acoustical panels and tiles in ceiling suspension system.
- .2 Co-ordinate ceiling work with work of other sections such as interior lighting, fire protection communication, and intrusion and detection systems.

3.03 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.04 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical ceiling installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 501-84(2009, Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by Taber Abraser.
- .2 ASTM D 2047-04, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
- .3 ASTM F1066-04, Standard Specification for Vinyl Composition Floor Tile.
- .4 ASTM F 1303-04(2009), Standard Specification for Sheet Vinyl Floor Covering with Backing.
- .5 ASTM F 1344-10, Standard Specification for Rubber Floor Tile.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit manufacturer's instructions, printed product literature and data sheets for flooring, adhesive, primer, sealer, and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit duplicate full size samples of each type of tile.
- .3 Submit 300 mm long base.

1.03 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for resilient flooring for incorporation into manual.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

1.05 SITE CONDITIONS

.1 Ensure high ventilation rate, with maximum outside air, during installation.

2 PRODUCTS

2.01 RESILIENT TILE FLOORING MATERIALS

.1 Vinyl composition tile: to ASTM F 1066, Composition 1 - non asbestos - Class 2 - through pattern tile, plain 3 mm, 300 x 300 mm size, colour as indicated.

2.02 ACCESSORIES

.1 Resilient base: continuous, top set, complete with premoulded end stops and external corners:
- .1 Type: vinyl, 2.0 mm thick
- .2 Style: cove.
- .3 Height: 101.6 mm.
- .4 Lengths: cut lengths minimum 2400 mm.
- .5 Colour: as indicated from manufacturer's standard colour range.

.2 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
- .1 Adhesives: VOC limit 0 g/L maximum to SCAQMD Rule 1168.

.3 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.

.4 Metal edge strips: extruded aluminum, smooth, polished stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.5 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.
- .1 Coating: VOC limit 50 g/L maximum to SCAQMD Rule 1113.

3 EXECUTION

3.01 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.

.2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
- .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

.3 Ensure floors are clean and dry.

3.02 PREPARATION

.1 Prepare for installation in accordance with manufacturer's written recommendations.

.2 Remove sub-floor ridges and bumps and fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface.

.1 Prohibit traffic until filler is completely cured and dry.

.4 Ensure existing vinyl flooring is removed by trained personnel.

.5 Remove or treat existing adhesives to prevent residual bleeding through to new flooring or interfering with bonding of new adhesives.

.6 Prime as recommended by resilient flooring manufacturer's written instructions.

3.03 APPLICATION: FLOORING

.1 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive that can be covered by flooring before initial set takes place.

.2 Resilient tile flooring:
- .1 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern.
- .2 Border tiles: half tile width minimum.
- .3 Install flooring to square grid pattern with joints aligned.

.3 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.

.4 Cut flooring neatly around fixed objects.

.5 Continue flooring over areas which will be under built-in furniture.

.6 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.

.7 Terminate resilient flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.8 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.04 APPLICATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners using premoulded corner units for right angle external corners and formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

3.05 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Remove excess adhesive from floor, base and wall surfaces without damage.

.2 Clean, seal and wax floor and base surface to flooring manufacturer's printed instructions.

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3.06 PROTECTION

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

.2 Protect new floors in accordance with manufacturer's printed instructions.

.3 Repair damage to adjacent materials caused by resilient flooring installation.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 Green Seal Environmental Standards (GS)
- .1 GS-11-2008, 2nd Edition, Paints and Coatings.

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

.3 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
- .2 Maintenance Repainting Manual - current edition.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Provide and maintain dry, temperature controlled, secure storage.
- .2 Store painting materials and supplies away from heat generating devices.
- .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.4 Fire Safety Requirements:
- .1 Supply 1 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.

1.04 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces.
- .2 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
- .3 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.

.2 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Additional application requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

2 PRODUCTS

2.01 MATERIALS

.1 Accredited products: only paint materials on the CGSB list of approved products are to be used for works of this section.

.2 Paint products used for the different coats of a paint system must be of the same manufacturer.

.3 Low odor products. Where possible select low odor paint products.

.4 Colours:

.1 See drawings

.5 Mixing and tinting:

.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations.

.2 Use and add thinner in accordance with paint manufacturer's recommendations.

.1 Do not use kerosene or similar organic solvents to thin water-based paints.

.3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.

.4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

.6 Paint systems:

.1 **System no 1** – for gypsum board ceilings.
One coat of emulsion paint, Zero VOC, conforming to CAN/CGSB 1.119
Two coats of emulsion paint, mate finish, Zero VOC, conforming to CAN/CGSB 1.100

.2 **System no 2** – for gypsum board partitions
One coat of emulsion paint, conforming to CAN/CGSB 1.119
Two coats of emulsion paint, pearl finish, conforming to CAN/CGSB 1.104

.3 **System no 3** – for interior galvanised metal surfaces of door and frames and of mechanical works.
Before applying the primer, clean the galvanised with an industrial chemical cleaner/degreaser no 3599, ae per method SSPC-SP-1 of the Steel Structures Painting Council.
Rince with clean water and let dry.
One alkyd rust proof primer coat for ferrous metal conforming to CAN/CGSB 1.40
Two coats of alkyd semi-gloss enamel paint, conforming to CAN/CGSB-1.57

.4 **System no 4 –** for primed ferrous metal surfaces
Paint touch-ups with primer paint conforming to CAN/CGSB-1.40
Two coats of epoxy ester glossy enamel paint, conforming to CAN/CGSB-1.59

.5 **System no 5** (alkyd resins) – for galvanised metal of all exterior components
One coat of primer paint with added cement, conforming to CAN/CGSB-1.59
Two coats of glossy enamel paint conforming to CAN/CGSB-1.59

.7 The systems described above are not exhaustive. It is the Contractor's responsibility to submit a proposal whenever an existing surface to be repainted is met and to perform the preparation and application works according to the system approved by the Department's Representative and as recommended by the manufacturer of the approved materials.

3 EXECUTION

3.01 GENERAL

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

.2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

3.02 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.03 PREPARATION

.1 Protection of in-place conditions:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative DCC RepresentativeConsultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .3 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual specific requirements and coating manufacturer's recommendations.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .6 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
- .7 Touch up of shop primers with primer as specified.

3.04 APPLICATION

.1 Use method of application approved by Departmental Representative.
- .1 Conform to manufacturer's application recommendations.

.2 Apply coats of paint in continuous film of uniform thickness.
- .1 Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between coats to remove visible defects.

.5 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.6 Finish closets and alcoves as specified for adjoining rooms.

.7 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.8 Mechanical/Electrical Equipment:
- .1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.
- .2 Do not paint over nameplates.

.3 Keep sprinkler heads free of paint.

.4 Paint both sides and edges of backboards for telephone and electrical equipment before installation.

.1 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.05 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM B 456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .3 ASTM A 653/A 653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A 924/A 924M-09, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
- .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
- .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.4 CSA International
- .1 CAN/CSA-B651-04, Accessible Design for the Built Environment.
- .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

1.03 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

2 PRODUCTS

2.01 MATERIALS

.1 Sheet steel: to ASTM A 653/A 653M with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A 167, Type 304, with brushed finish.

.3 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.02 COMPONENTS

.1 Toilet tissue dispenser: double roll type, surface mounted, chrome plated steel frame, capacity of 500 double ply roll. (WC-local 104)

.2 Paper towel dispenser: for single roll, folded and roll paper towels, stainless steel cabinet, hinged front panel,, lock and key, semi-recessed mounted. (WC-local 104)

.3 Combination towel dispenser/waste receptacle: recessed semi-recessed wall unit, approximately 355 mm wide, 600 mm high, 190 mm deep. Interior of 0.8 mm galvanized steel, exterior of 0.8 mm stainless steel. Suitable for dispensing folded or roll paper towels. Removable galvanized steel waste receptacle, lockable access door with continuous full height stainless steel hinge. (Break room – local 102)

.4 Soap dispenser: liquid push-in valve 64 mm spout, self contained 340 mL translucent polyethylene, stainless steel piston and valve assembly, tamper proof filler lock, surface mounted, exposed metal components chrome plated.(Break room – local 102 and Wc-local 102)

2.03 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.04 FINISHES

.1 Chrome and nickel plating: to ASTM B 456, satin finish.

.2 Manufacturer's or brand names on face of units not acceptable.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.

3.02 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:

.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.

.3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.

.4 Toilet and shower compartments: use male to female through bolts.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

3.03 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.04 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.05 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.06 LOCATION

.1 See drawings for location and quantity

END OF SECTION

PART 1 - GENERAL INFORMATION

1.1 RELATED REQUIREMENTS

.1 Section 23 05 53 : Identification of networks and equipment.

.2 Section 01 33 00 – Submittal procedure.

1.2 REFERENCES

.1 Fire extinguishers shall comply with the followings standards:
- .1 NFPA 10, Portable fire extinguishers;
- .2 Fire Safety Code – Ministry of Municipal Affairs.

.2 Underwriters Laboratory of Canada (ULC).

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
1.4.1	BP	Submit technical descriptions of portable fire extinguisher products.	Prior to delivery, according to the requirements for presentation of technical data sheets and / or shop drawings	Letters of transmission. Recording of technical descriptions.	Contractor
1.5.1	BP	Submit certificates of conformity of fire extinguishers.	At the delivery.	Attestation of conformity Documents	Contractor
1.6.1	MP	Inspection of fire extinguishers.	At each reception.	Inspection reports	Contractor
1.7.1	MP	Inspection of the installation of fire extinguishers.	During the work, according to the determined frequency and at the end of the work.	Inspection reports	Contractor

BP : Breakpoint **MP** : Monitoring point

1.4 TECHNICAL DESCRIPTIONS OF THE PRODUCTS

.1 Submit the technical descriptions of the Products specified at Part 2 for the Portable fire extinguishers, in accordance with the prescriptions of section 01 33 00 - Submittal procedure.

1.5 ATTESTATION OF CONFORMITY

.1 Provide a written document attesting that these items have been authorized for use by a nationally recognized testing organization such as FM and / or ULC.

1.6 DELIVERY INSPECTION

.1 Inspect portable fire extinguishers and accessories on-site at delivery and submit inspection reports.

1.7 INSPECTION OF WORKS

.1 Inspect the installation of portable fire extinguishers including the supports and cabinets upon completion of the work. At each inspection, submit an inspection report.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind in accordance with the established methods and in respect to the type of waste treatment defined as per the environmental section of the specific clauses.

PART 2 - PRODUCTS

2.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS – INCLUDED IN EX1 ET EX2

.1 Multi-purpose dry chemical extinguishers: Stored pressure rechargeable type with hose and shut-off nozzle, ULC or FM labelled for A, B and C class protection, installed on wall brackets, in cabinets, Size4.5 kg: 6A:80B:C ULC

2.2 EXTINGUISHER BRACKETS – EX1

.1 Support bracket for extinguishers: Type recommended by extinguisher manufacturer..

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Supply, install or mount recommended fire extinguishers, built-in cabinets and wall brackets by the manufacturer.

.2 Clearly identify cabinets according to Section 23 05 53 – Mechanical Identification.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Not applicable.

1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)

.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International

.1 ASTM A490M-12, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints Metric.

.2 ASTM A653/A653M-13, Standard Specification for Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.81-M90(R1990), Air Drying and Baking Alkyd Primer for Vehicles and Equipment.

.2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.

.3 CGSB 31-GP-107Ma-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.4 CSA Group

.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.5 Green Seal (GS)

.1 GS-11-2013, Standard for Paints and Coatings.

.6 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.1 MPI #76, Quick Dry Alkyd Metal Primer.

.2 MPI #96, Quick Dry Enamel Gloss.

.7 South Coast Air Quality Management District (SCAQMD)

.1 SCAQMD Rule 1113-13, Architectural Coatings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for metal shelving and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.2 Indicate shelving layouts, number of bays, number of shelves, number and size of drawers, bins, number of dividers, system of bracing and anchoring devices.

.4 Samples:

.1 Submit representative sample bay of specified shelving showing finish colour and including accessories.

.5 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Planhighlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Low-Emitting Materials:

.1 Submit listing of paints and coatings adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restriction requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions 01 61 00- Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect specified materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section.

.5 Packaging Waste Management: remove for reuse by manufacturer and return of pallets, padding, packaging materials crates, as specified in Construction Waste Management Plan in accordance with Section Section.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Design and construct metal storage shelving to support uniform load of 500 kg/m²

.2 Design shelving to accommodate vertical adjustment of shelves in 50 mm increments and to permit easy assembly, expansion, dismantling and re-use of shelving component parts.

2.2 MATERIALS

.1 Galvanized steel sheet: commercial grade to ASTM A653/A653M with Z275 zinc coating.

.1 Recycled content: 20%. 01 35 21

.2 Steel sections and plates: to CSA G40.20/G40.21, Type 400 W.

.1 Recycled content: 20%. 01 35 21

.3 Steel bolts, nuts and washers: to ASTM A490M.

.4 Welding materials: to CSA W59.

.5 Sheet aluminum: mill finish plain pattern utility sheet.

.1 Recycled content: 20%. 01 35 21

.6 Aluminum sections and plates: AAI alloy AA 6063-T5.

.1 Recycled content: 20%. 01 35 21

.7 Aluminum bolts, nuts and washers: AAI alloy AA6061-T6.

.8 Shelving:

.1 Storage shelving:

.1 Size: width 600 mm x 1200 mm by unit

.2 Profile: Rectangular

2.3 COMPONENTS

.1 Uprights:

.1 Roll formed aluminum angles or tees with perforations to accommodate shelves and other components.

.2 Size and thickness of angles or tees to support specified total load.

.2 Shelves:

.1 Brake formed sheet metal, reinforced to carry specified loads.

.2 Punch holes in shelves to accommodate dividers and other components.

.3 Kickplates: formed sheet metal to close opening between bottom shelf and floor on front and on sides of shelving bay.

.4 Back: 0.6 mm core thickness steel sheet to enclose shelving bay extending from bottom shelf to top shelf.

.5 Side panels: 0.6 mm core thickness steel sheet panels to close ends of shelving bays or sections and as partitions between adjacent bays.

.6 Dividers:

.1 Reinforced sheet metal plates for subdividing shelves into bins.

.2 Provide for attachment of dividers to shelves immediately above and below dividers.

.7 Bin fronts: formed sheet metal, attached to front edge of shelf to prevent small parts from falling over edge of shelf.

.8 Gusset plates: heavy gauge metal plates to reinforce corner connections of shelving components.

.9 Braces:

.1 Provide sway braces for open type shelving.

.2 Use side sway braces on two exposed sides of each rack and at alternate bays.

.3 Use back sway braces on two end sections of each bank and on alternate bays.

.10 Label holders: attachable to front edge of shelf with provision to hold paper or plastic label.

.11 Drawers: of sizes indicated, complete with pull hardware, dividers and label holders.

.12 Base plates: metal or plastic plates to take uprights and to protect floor surfaces.

2.4 FINISH

.1 Finish shelving system painted vinyl coated in standard grey colour selected by Departmental Representative.

.2 Condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma.

.3 Apply one coat type 2 primer to CAN/CGSB-1.81 MPI #76 and bake.

.1 Primer: maximum VOC limit 250 g/L to GS-11 Standard.

.4 Apply two coats of type 2 enamel to CAN/CGSB-1.88 MPI #96 and bake to hard durable finish.

.1 Enamel Finish: maximum VOC limit 50g/L to SCAQMD Rule 1113 to GS-11 Standard.

.5 Manufacturers or brand names on face of units are not acceptable if not prominently displayed.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal shelving installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Proceed at the demolition of existing storage shelving and disposal.

.2 Do metal storage shelving work except where specified otherwise.

.3 Install metal storage shelving in accordance with reviewed layout.

.4 Brace, secure and anchor shelving units in place.

.5 Make good baked enamel surfaces damaged during shipment or installation.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal 01 35 21.

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

3.4 PROTECTIVE GRILL

.1 References

.1 ASTM International

1. ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
2. ASTM A90/A90M-09, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
3. ASTM A121-07, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
4. A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM C618-08a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
6. ASTM F1664-08, Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.
7. ASTM A123/A123M-09, Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.

2. Canadian General Standards Board (CGSB)
    1. CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
    2. CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
    3. CAN/CGSB-138.3-96, Installation of Chain Link Fence.
    4. CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
3. CSA International
    1. CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
    2. CAN/CSA-A3000-08, Cementitious Materials Compendium.

.2 Materials

.1 Concrete mixes and materials: in accordance with Section **03 30 00**.
- .1 Nominal coarse aggregate size: 20-5.
- .2 Compressive strength: 20 Mpa minimum at 28 days.
- .3 Additives: fly ash to CSA A300, ASTM C618.

.2 Chain-link fence fabric: to CAN/CGSB-138.1.
- .1 Weak style, with polyvinyl coated.
- .2 Height of fabric: as indicated on plans.

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe polyvinyl coated. Dimensions as indicated.

.4 Tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.

.5 Tie wire fasteners: aluminium alloy wire polyvinyl coated.

.6 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel polyvinyl coated.

.7 Gates: to CAN/CGSB-138.4.

.8 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel.
- .1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
- .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
- .3 Overhang tops to provide waterproof fit, to hold top rails and an outward projection to hold barbed wire overhang.
- .4 Include projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart.
- .5 Projection of approximately 300 mm long to project from fence at 45 degrees above horizontal.
- .6 Turnbuckles to be drop forged.

.9 Organic zinc rich coating: to CAN/CGSB-1.181, MPI #18.

.10 Barbed wire: to ASTM A121, 2 mm diameter galvanized steel wire 4 point barbs 125 mm spacing.

.11 Barbed wire: to CAN/CGSB-138.2, 2,5 mm diameter.

END OF SECTION

PART 1 - GENERAL INFORMATIONS

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal procedures

.2 Section 01 78 00 – Closeout work documents and samples to submit

.3 Section 01 35 29.06 – Health and safety

.4 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC networks

1.2 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROUVAL/INFORMATION

.1 Submit required documents and samples in accordance with Section 01 33 00 - Submittal procedures.

.2 Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.

.3 Shop drawings must show:
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:
- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.5 In addition to the transmittal letter referred to in Section 01 33 00 – Submittal procedures, use the MCAC "Shop Drawing Submittal Title Sheet". Identify section and item paragraph number.

.6 Closeout Submittals:
- .1 Provide operation and maintenance data for incorporation into the manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 Operation data to include:
  - .1 Control schematics for each system including the command circuits/ambient temperature controls.
  - .2 Description of each system and their controls.
  - .3 Description of the operation of each system at various loads including reset schedules and seasonal variances.
  - .4 Operation instruction for each system and their components.
  - .5 Description of the actions to be taken in the event of equipment failure.
  - .6 A flow diagram and valve description table.
  - .7 Colour coding chart.

.4 Maintenance data to include:
- .1 Servicing, maintenance, operation and trouble-shooting instructions for each equipment component.
- .2 Data to include the maintenance frequency schedules and duration, including the required tools.

.5 Performance data to include:
- .1 Equipment manufacturer's performance data sheets with point of operation as determined following the commissioning.
- .2 Equipment performance verification test results.
- .3 Special performance data as specified.
- .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC networks.

.6 Approvals:
- .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
- .2 Should the case be, make the required changes to the operational manual and re-submit to the Departmental Representative.

.7 Additional data:
- .1 Prepare and insert into the operation and maintenance manual all relevant additional data collected during the previously mentioned training sessions, if deemed necessary.

.8 Site records:
- .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Indicate changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
- .2 Transfer information weekly to reproducibles, thus updating the reproducibles to show work as actually installed.
- .3 Use different colour waterproof ink for each network.
- .4 Keep theses updates on site and readily available for reference purposes and inspection.

.9 As-built drawings:
- .1 Prior to start of Testing, Adjusting and Balancing (TAB) of the HVAC system, complewte the as-built drawings.
- .2 Identify each drawing in the lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
- .3 Submit to the Departmental Representative for approval and make corrections as directed.
- .4 Perform testing, adjusting and balancing for the HVAC system using as-built drawings.
- .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

.1 Health and Safety Requirements: conduct all construction work using occupational health and safety standards in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 MAINTENANCE

.1 Supply spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
- .1 One set of packing for each pump.
- .2 One casing joint gasket for each size pump.
- .3 One head gasket set for each heat exchanger.
- .4 One glass tube for each level gauge.
- .5 One filter cartridge or set of filter media for each filter or filter bank in addition to the final operating set.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

.3 Supply one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 99 - Painting for minor works .

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air treatment units.

3.3 DEMONSTRATION

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:
- .1 Portable extinguishers

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instructional materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Departmental Representative will record the training sessions on video tape for future reference.

3.4 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to the system.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 21 05 01 – Mechanical – General Requirements regarding work results

.2 Section 22 05 01 – Plumbing – General Prescriptions

.3 Section 23 05 00 – Common work results for HVAC

1.2 DOCUMENTS / SAMPLES TO SUBMIT FOR APPROUVAL / INFORMATION

.1 Submit the documents and required samples in accordance with Section 01 33 00 – Submittal procedures.

.2 Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.3 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:

- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.5 In addition to the transmittal letter referred to in Section 01 33 00 – Submittal procedures: use the published MCAC "Shop Drawing Submittal Title Sheet". Identify section and item paragraph number.

.6 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into the manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .3 Operation data to include:
  - .1 Control schematics for each system including environmental controls.
  - .2 Description of each system and their controls.
  - .3 Description of the operation of each system at various loads including the reset schedules and seasonal variances.
  - .4 Operation instruction for each system and their components.
  - .5 Description of actions to be taken in the event of equipment failure.

.6 Flow diagram and valve table.

.7 Colour coding chart.

.4 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each equipment component.

.2 Data to include frequency schedule and duration including required tools.

.5 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as determined after the commissioning is completed.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports (TAB) as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC systems.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Should the case be, make the required changes to the operational manual and re-submit to the Departmental Representative.

.7 Additional data:

.1 Prepare and insert into the operation and maintenance manual all additional data obtained during the training sessions, if deemed necessary.

.8 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service network.

.4 Keep these drawings on-site and make readily available for reference purposes and inspection.

.9 As-Built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC systems, complete the as-built drawings.

.2 Identify each drawing in the lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to the Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC systems using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in the final TAB report.

1.3 QUALITY ASSURANCE

.1 Health and Safety Requirements: conduct all construction works with respect to the occupational health and safety standards and in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 MAINTENANCE

.1 Supply spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass tube for each level gauge.

.2 Provide one set of special tools required to service equipment as recommended by the manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 99 - Painting for minor works.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum the interior of the ductwork and air treatment units.

3.3 DEMONSTRATION

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to the following equipment and systems:

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use the operation and maintenance manual, as-built drawings, and audio visual aids as part of instructional materials.

.5 Instruction duration time requirements are indicated as specified in the appropriate sections.

.6 Departmental Representative will record the training sessions on video tape for future reference.

3.4 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 01 74 11 : Cleaning.

.3 Section 01 78 00 - Closeout submittals.

.4 Section 03 30 00 : Poured concrete.

.5 Section 09 91 99 : Painting for minor works

.6 Section 22 05 53 : Plumbing - Identification of networks and equipment.

.7 Section 22 05 93 : Plumbing - Testing, balancing and commissioning of systems.

.8 Section 22 07 19 : Thermal networks - Thermal insulation for pipes.

.9 Section 22 15 01 : Gas and compressed air plumbing networks.

.10 Section 22 42 00 : Plumbing specialties and accessories.

.11 Section 23 05 01 : General prescriptions for HVAC.

.12 Section 23 05 48 : Vibration and seismic controls for HVACc piping and equipment.

.13 Section 23 07 13 : Duct insulation

.14 Division 26 : Electricity

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB) :
- .1 CGSB 1-GP-181M, Zinc rich coating, organic and prepared;
- .2 CGSB 19-GP-M, Putty sealant, polymerized by solvent evaporation.

.2 Manufacturer's Standardization of the Valve and Fittings Industry (MSS) :
- .1 MSS-SP58, Pipe hangers and supports – Materials, design and manufacture.

.3 Canadian Standards Association (CSA) :
- .1 CSA C22.2, Candian Electricity Code, second part – Commercial Products and General Public.

.4 National Electrical Manufacturers Association (NEMA).

.5 Underwriters Laboratory of Canada (ULC).

.6 Canadian Standards Association (CSA).

1.3 QUALITY MANAGEMENT

.1 Conduct the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE					
ART.	**BP/MP**	**PRESCRIPTIONS**	**MOMENT**	**RECORDS**	**RESPONSABILITY**
	MP	Certification of labor	Before the begining of work	Certification of labor	Contractor
1.5	BP	Shop drawings and/or technical product descriptions.	Prior to delivery, as required for submission of shop drawings and / or execution of bid solicitation.	Letters of transmission. Recording of the shop drawings and / or technical descriptions	Contractor
1.6	BP	Technical data	Prior to delivery, according to the requirements for submission of shop drawings or execution of the call for tenders.	Letter of transmission. Recording of the technical data review.	Contractor
1.7	BP	Attestation of conformity.	A la livraison.	Attestation of conformity	Contractor

BP : Breakpoint **MP** : Monitoring point

1.4 SHOP DRAWINGS ANG PRODUCT TECHNICAL DESCRIPTIONS

.1 Submittals: in accordance with Section 01 33 00 – Submittal procedures.

.2 Also indicate on the shop drawings the conformity to the plans and specifications of the quality and the mechanical and electrical characteristics.

.3 Shop drawings to show:
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:
- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.5 Submit requests for equivalent products in accordance with Section 01 33 00 - " Submittal procedures ".

.6 Submit requests for substituted products in accordance with Section 01 33 00 - " Submittal procedures ".

.7 Present with the shop drawings a comparative table for an equivalence or a substitution for the specified product, and adapt it for the relevant characteristics or those described in the specifications or drawings of this type of equipment.

.8 The Departmental Representative may return the table if found incomplete and must be completed by the contractor to allow to continue the verification procedure for this equipment:
- .1 Submit the shop drawing of the proposed product in equivalence or substitution at the same time as the comparative table.

.9 Workshop drawings must be submitted for (non-exhaustive list) :
- .1 Plumbing fixtures (with identification to plans), including accessories;
- .2 Floor drains;
- .3 Access doors for mechanical spaces;
- .4 Faucets;
- .5 Check valves;
- .6 Plumbing accessories;
- .7 Supports and hangers.

1.5 RELIABILITY OF TECHNICAL DATA

.1 Data obtained from manufacturers' catalogs and documentation shall be reliable data confirmed by tests carried out by the manufacturers themselves or on their behalf by independent laboratories and certifying the conformity of the elements with the requirements of the applicable codes and standards.

.2 Provide documents confirming tests.

1.6 ATTESTATION OF CONFORMITY

.1 Provide a written document attesting of the compatibility of the components and, if applicable, that these elements have been authorized for use by a nationally recognized testing organization such as CSA, ULC .

1.7 MAINTENANCE SHEETS

.1 Provide the necessary instructions for the maintenance of:
- .1 all equipment submitted in shop drawings.
- .2 and incorporate them in the operation and maintenance manual in reference with 01 78 00 – Closeout submittals.

1.8 SPARE PARTS

.1 Provide the following spare parts.
- .1 A set of seals for each duct heater;

1.9 ENERGY COMSUMPTION

.1 Materials submitted for approval to the Departemental Representative may be rejected based on performance relative to the power demand or energy consumed.

1.10 MATERIAL: PARTICULARITY AND IMPLEMENTATION

.1 Ensure that maintenance and dismantling can be accomplished by minimizing the displacement of piping and duct joints by using union joints and flanges and that structural framing elements or any other installation should not be an obstacle.

.2 Provide an easy way to lubricate equipment, including lifetime lubricated bearings.

.3 Place the pieces of equipment on a 150 mm high concrete slab with bevelled edges and overflowing at least 50 mm around the appliances to facilitate cleaning, as shown in the drawings

.4 Connect purge lines or drainage on drains.

.5 Purge lines are required for the following equipment:
- .1 Water heater;
- .2 Eye wash fountain;
- .3 Pan;
- .4 VA1;
- .5 VA2.

.6 Align the edges of the pieces of equipment and those of the rectangular drains covers and similar items with the walls of the building where possible.

1.11 SEALING OF OPENINGS

.1 Prevent dust, dirt and other foreign materials from entering in the openings of equipment and appliances.

1.12 THERMOMETERS ET MANOMETERS

.1 Place indicating thermometers and manometers so that they can be read from a floor or platform.

.2 Always place thermometers in thermowells.

.3 Install thermometers where indicated and at inlet and outlet of the following equipment:
- .1 Water heater

.4 Select the thermometers and pressure gauges according to the temperature and the pressure to be measured and so that the measuring point is in the center of the graduated range.
- .1 Indicating thermometer :
  - .1 Industrial thermometers, variable angular readings, liquid expandable, 180 mm scale, in accordance with CGSB 14-GP-2a;
- .2 Thermometer :
  - .1 Thermometers with 100 mm dial, mercury, stainless steel Bourdon tube, brass movement, stainless steel capillary, stainless steel spiral and bulb, aluminum housing for wall mounting;

.3 Thermowells :

.1 For installation in a copper pipe, use copper or bronze wells and, for installation in a steel pipe, use stainless steel wells;

.4 Manometer :

.1 Manometers with 100 mm dial, conforming to CGSB 91-GP-3, precision to within 1%, unless otherwise indicated;

.2 Provide a bronze stopcock and the following, as required :

1. A damper in the case of networks subjected to pressure pulses;

1.13 ELECTRICAL INSTALLATION AND EQUIPMENT

.1 Electrical work shall be carried out in accordance with the requirements of Division 26 and the following paragraphs :

.1 The responsibility of the supplier and the installer of the electrical appliances and installations is described on the electrical drawings; The responsibility of the supplier and the installer of mechanical equipment and installations is described in the table of mechanical equipment and installations which appears in the mechanical drawings.

.2 Refer to Division 26 - "Electrical" for wiring and control conduit requirements including conduits, wires, cables, and connections associated with a network / circuit operating at less than 50 V.

.3 Mechanical appliances are provided with connection terminals capable of receiving either copper or aluminum conductors.

1.14 MOTORS

.1 Provide and install motors for mechanical installations and equipment.

.2 If the delivery delays the installation of equipment, provide and install a provisional motor with the approval of the departmental representative. No equipment will be accepted permanently until the prescribed motor has been installed.

.3 The motors will have the characteristics as per the description of each equipment. They will be designed for minimal vibration and a silent operation

.4 Motors shall be manufactured in accordance with CSA C22.2 and AMEEC M1-6 standard for ambient temperature of 40 ° C, duty factor 1.15 and T-box according to NEMA

.5 Unless otherwise specified, motors shall be vented, open drip-proof. The motors will be equipped with ball bearings or roller bearings, lubricated with grease.

.6 Unless otherwise specified for a special application, motors of 0.25 kW or less will operate at 120 volts, one phase, 60 Hz, 1200 or 1800 rpm. Motors of 0.37 kW or more will operate at 600 volts, 3 phases, 60 Hz, 1200 or 1800 rpm. Motors at 3600 rpm will not be accepted.

.7 The motors will be high efficiency according to the NEMA standard.

.8 The manufacturer of a motorized device will be responsible for the choice of the motor. The motor power in kW specified in the drawings and specifications should be considered as a minimum. If the size of a motor should be increased, the contractor will be responsible for the changes caused to all other specialties.

.9 The protection against overheating will be with thermistors installed in the factory, one on each phase, connected to terminals marked and placed in the junction box of the motor. Provide thermistors for motors of 18.7 kW and more.

.10 Motors of 29.8 kW or more will be starting at reduced voltage.

1.15 SUSPENSION BRACKETS AND PIPE SUPPORTS

.1 The suspension brackets, supports and bracing components will be in accordance with ASME B31.1 and MSS-SP58.

.2 The anchoring sleeves must be installed before the concrete is poured. They must be arranged in a gridded network in the motor rooms.

.3 Anchor sleeves must be secured to the framing elements. If there are no framing elements or the anchor sleeves are not in the right place, hang the brackets to U-shaped profiles or to steel angles. Supply and install additional framing parts. Obtain permission from the Departmental Representative before using vertical expansion anchor sleeves. Use at least two sockets to hold each support or bracket. Do not hang them on the metal deck. Fasten piping and equipment according to the manufacturer's recommendations. Have the anchor plan verified.

.4 Brackets and supports
- .1 Use adjustable suspension shackles for pipes of all sizes. If necessary, use roller supports;
- .2 Use rigid suspension clamps when the ratio of pipe expansion to stem length of the collar is not more than 25:600 when supporting domestic hot water piping. The minimum length of the rod must be 300 mm.
- .3 Use flexible hose clamps where the ratio of pipe expansion to collar rod length is not more than 100:600 when supporting domestic hot water piping. The minimum length of the rod must be 300 mm.
- .4 Use roller brackets with bracing in the following cases :
  - .1 when the ratio referred to can not be obtained;
  - .2 when the suspension brackets can not be fixed to the upper part of a structural steel frame.
- .5 The minimum length of suspension rods shall be 150 mm for all piping, except as indicated above.

.5 Supply and install spring brackets when it is necessary to compensate for the expansion of horizontal pipes connected to long risers.

.6 The spacing between the grouped pipe supports will be based on the smaller pipe size

.7 Except in the following cases, refer to the table below for the diameter of the rods and the spacing of the supports :
- .1 Support sanitary piping in accordance with the most stringent requirements of the Provincial Code and Municipal Plumbing Codes or, as specified in the specifications.
- .2 Install a bracket every 1.5 m for copper tubes with nominal diameter DN 1/2.
- .3 Support the plastic piping according to the manufacturer's recommendations.

PIPE SIZE (NOMINAL DIAMETER)	ROD DIAMETER	MAXIMUM SPACING PIPING	
		IRON	COPPER
DN 1-1/4	10 mm	2,1 m	1,8 m
DN 1-1/2	10 mm	2,7 m	2,4 m
DN 2	10 mm	3,0 m	2,7 m
DN 2-1/2 et 3	10 mm	3,6 m	3,0 m
DN 3-1/2	10 mm	3,9 m	3,3 m
DN 4	16 mm	4,2 m	3,6 m
DN 5	16 mm	4,8 m	---
DN 6	22 mm	5,1 m	---
DN 8	22 mm	5,7 m	---
DN 10	22 mm	6,6 m	---
DN 12	22 mm	6,9 m	---

.8 Have the arrangement and type of the supports and wall hooks verified :
- .1 Place the bracket within 300 mm of each horizontal bend;
- .2 All supports must have at least the following three parts: anchor sleeve, suspension rod, collar or stirrup;
- .3 Use mild steel wall hooks to support non-expandable pipes. Leave a clearance of at least 25 mm to allow thermal insulation;
- .4 Provide and install collars to support risers, as indicated.

.9 In the case of non-insulated copper pipes, use copper-plated or copper brackets.

.10 Insulating bolster
- .1 Install insulating bolster on insulated pipes and prefabricated insulating braces made of high density insulating material;

.11 The suspension collar and anchors must be offset so that the rod is vertical when the piping is hot.

.12 Adjust the height of the suspension rods according to an even distribution of the load.

.13 For any other type of piping, follow the manufacturer's recommendations.

1.16 SLEEVES

.1 Locate, supply and install sleeves to concrete or masonry wall or floor crossings. The sleeves of 150 mm in diameter and over will be installed in conjunction with the formwork contractor (for concrete elements) and the general contractor (for masonry elements). Sleeves and frames less than 150 mm in diameter will be installed entirely by the specialized contractor.

.2 Supply and install plastic sleeves, galvanized sheet steel, at least 0.8 mm thick, with seam sealed.

.3 Use cast iron or steel sleeves with flange secured to the center by continuous welding. :
.1 through foundation walls;
.2 if the sleeve must exceed the finished floor

.4 Bushings
.1 Use compression-sealing bushing where indicated in drawings;

.5 Dimensions :
.1 Leave an annular clearance of 6.0 mm between the sleeve and the pipes or between the sleeve and the insulation;
.2 If the piping passes under foundation footings, leave an annular clearance of at least 50 mm between the sleeve and the pipe. Backfill under the sole with concrete of the same strength as that of the sole.

.6 Lay the sleeves so that they are flush with the concrete and masonry surfaces and exceeding 50 mm above the finished floors above the ground. For concrete floors poured directly on the ground, the sleeves will be flush.

.7 Use galvanized cast iron sleeves with caulking groove and clamp for piping through roofs. Secure the sleeves in the roof, caulk between the sleeve groove and the hose, secure the roof flashing to the retaining collar and make waterproof and durable seals.

.8 Fill the voids around the pipes:
.1 In the case of crossings of foundation walls or floors below ground level, caulk with a flame-retardant and non-hardening putty the clearance between the sleeve and the pipeline protected by the latter;
.2 In the case of wall or floor crossings, provide the space required for the installation of a fireproof material. In the case of pipes or pipes passing through floors, ceilings or partitions rated for fire resistance, do not impair the fire resistance of the structures through which they are passed.
.3 Ensure that there is no contact between the copper tubes or pipes and the ferrous metal sleeves;
.4 Fill with a lime plaster or other filler easy to remove the sleeves that will be used later;
.5 Apply on the exposed exterior surfaces of the ferrous metal sleeves a thick layer of zinc-rich paint conforming to CGSB 1-GP-181M.

.9 Where piping passes through fire-resistant walls, seal open spaces of approved material and caulk in accordance with CGSB 19-GP-M and seal with a sealant for penetration pathway of 3M.

.10 Provisionally seal all openings during work.

1.17 FIRE-RESISTANT MATERIALS

.1 Supply and installation of fireproof material in the annular space between the pipes, piping, insulation and adjacent fire separation.

.2 Unheated pipes without heat insulation that are not subjected to a particular movement do not require special treatment.

.3 Heated pipes without heat insulation subjected to a certain movement must be covered with a non-combustible smooth material allowing a certain movement of the pipe without risk of damaging the fire-resistant material.

.4 The insulation and the vapor barrier of the pipes must not be interrupted or damaged at the crossing points of the fire separations.

1.18 ROSETTE

.1 Install rosettes where piping passes through walls, partitions, floors and finished ceilings only in the visible areas, for pipes up to DN 6, overall size.

.2 Use chrome or nickel-plated brass rosettes or 302 grade stainless steel, one-piece type, with locking screws.

.3 The outer diameter of the rosettes must be greater than the diameter of the opening or sleeve to be concealed.

.4 The inside diameter of the rosettes must fit perfectly to the outside diameter of the pipes.

1.19 PAINT

.1 Observe the requirements of section 09 91 99 - "Painting for minor works"..

.2 Apply at least one coat of corrosion-resistant primer on ferrous metal supports / suspensions as well as on-site materials in unheated areas.

.3 Prepare and retouch surfaces with damaged paint finishes and ensure that the new finish matches the original finish.

.4 Refurbish surfaces where the finish has been severely damaged to require only a primer and touch-up.

1.20 SPECIAL TOOLS

.1 Provide a kit of all special tools required for the maintenance of the equipment, as recommended by the manufacturers.

1.21 ACCESS DOORS

.1 Unless otherwise indicated, place access doors in ceilings or bulkheads to allow for the maintenance of equipment and accessories or the inspection of safety and control devices . Access doors must be selected and installed according to the requirements of the section on the construction of walls or ceilings.

.2 Unless otherwise indicated, access doors must be flush mounted and have 600 x 600 mm for a hole entrance and 300 x 300 mm for a handhole. They must open at 180 degrees and have rounded corners. They shall be fitted with concealed hinges, screwdriver latches and anchor fittings. The steel must be primed and the doors must come from a recognized manufacturer.

.3 In the case of tiled surfaces, the access doors must be of stainless steel.

1.22 DIELECTRIC CONNECTIONS

.1 Provide dielectric fittings for joining pipes made of different metals.

.2 Provide dielectric fittings for pipes with nominal diameters DN not exceeding 2 and flanges for pipes with nominal diameters DN greater than 2;

.3 On the approval of the departmental representative, cast brass fittings may be used.

.4 Supply and install felt or rubber linings to prevent contact between elements made of different metals.

1.23 CLEANING

.1 Clean the equipment and mechanical appliances of the building in accordance with the requirements of Section 01 74 11 - Cleaning.

.2 Clean inside and outside of all parts and appliances, including strainers and filters.

.3 Just before the provisional acceptance of the installations, clean and refurbish all the appliances and leave them in perfect working order; Replace all filters and strainers in hydraulic systems.

1.24 EVACUATION TAPS

.1 Install evacuation valves at the low points and near the sectioning taps unless otherwise indicated.

.2 Valves having a diameter of at least DN 3/4, unless otherwise specified, of bronze, with threaded end for hose connection.

1.25 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCT (NOT APPLICABLE)

PART 3 - EXÉCUTION (NOT APPLICABLE)

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 09 91 99 : Painting for minor works

.3 Section 22 05 01 : Common work results for plumbing.

.4 Section 22 07 19 : Thermal networks - Thermal insulation for pipes.

1.2 REFERENCES

.1 Execution of Work: as per CGSB 24-GP-3a, unless otherwise indicated.

.2 CSA and / or ULC certification plates: as required by these organizations.

.3 Underwriters Laboratory of Canada (ULC).

.4 Canadian General Standards Board (CGSB) :
.1 CGSB 24-GP-3a, Identification and classification of piping systems;
CGSB 1-GP-12C, Standard paint colors. Remplaced by : (Federal Standard 595B).

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
1.4	**BP**	Technical product descriptions.	Prior to delivery, as per requirements for submission of shop drawings or bidding execution.	Letter of transmission. Recording of technical descriptions.	Contractor
1.5	**MP**	Texts of nameplates and list of device numbers.	Before burning the texts on the rating plates.	Letter of transmission. Registration of the review lists.	Contractor

BP:BREAKPOINT **MP** MONITORING POINT

1.4 TECHNICAL DESCRIPTION OF PRODUCTS

.1 Submit technical product descriptions in accordance with Section 01 33 00 - Submittal procedures.

1.5 TEXT AND LIST OF EQUIPMENT NUMBERS

.1 Submit the texts and list of installed equipment numbers.

PART 2 - PRODUCT

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer. Lettering and numbers raised or recessed.

.1 Information to include, as appropriate:
- .1 Equipment: manufacturer's name, model, size, serial number, capacity.
- .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATE

.1 Supply and install self-adhesive lamicoid plastic plates 90 mm x 40 mm x 3 mm nominal thickness, with black lettering engraved on a 6 mm white background.

.2 Secure the plates securely in conspicuous places. On appliances with a non-insulated flat surface, the plates must be screwed to the appliance.

.3 Engrave the number of the appliance, its function, the serviced area and the starter, inverter or CCM which controls it;

.4 Inscription must be in French and in English;

.5 Submit the text tag list to the Departmental Representative before engraving the message.

2.3 PIPING

.1 Identification :
- .1 Identify piping using basic colors, arrows, pictograms and inscriptions.

.2 Basic colors:
- .1 Comply with the conventional color chart of CGSB 1-GP-12C and CSA B149.2 as follows:

CLASSIFICATION OF MATERIALS	BASIC COLORS	PICTOGRAMS COLORS	LEGEND AND ARROWS
Hazardous Material	Yellow 505-101	Red 509-102	Black 512-101
Harmless Materials	Green 503-107	White 513-101	White 513-101
Protective Materials	Blue 202-101		

- .2 Apply the base color to the pipe of outside diameter, including insulation, greater than or equal to DN 11/2 by means of:
  - .1 Adhesive tape with appropriate colored arrow 50 mm wide, spirally wound on the pipe or its casing. At each end, add one turn of adhesive tape plus an overlap of one-third (1/3) the diameter of the pipe. Apply self-adhesive label of the same color;
- .3 The length of the tape will be 700 mm for pipes with a diameter less than DN 6 and 1 m for those with a diameter greater than or equal to DN 6.

.3 Inscription :

.1 If the base color has been painted, apply the characters on the base color using stencils or prints. If tape and tags have been used, add the inscription on the label by means of self-adhesive letters and arrows;

.2 Identify the flow direction of the fluid in the pipe by an arrow downstream of the marking. In the case of a reversible flow, place the inscription between two arrows of opposite direction;

.3 The color of the lettering and arrows will be white when the base color is green or red, and black if the base color is blue or yellow. The characters will be in "universe" style;

.4 The characters size shall correspond to the diameter of the pipe as follows :

NOMINAL EXTERNAL DIAMETER	HEIGHT OF LETTERS	WIDTH OF LINE (MINIMUM)	LENGTH OF ARROWS	WIDTH OF ARROWS
11/2 à 21/2	20 mm	6 mm	100 mm	20 mm
3 à 5	50 mm	8 mm	150 mm	50 mm
6 and +	90 mm	8 mm	150 mm	50 mm

.4 Pictograms :

.1 Provide and apply the pictograms to the right of the legend, one after the other if there are several, on the base color;

.2 Print self-adhesive pictograms on Brady B-350 or B-500 vinyl material depending on the application, with the approval of the Departmental Representative;

.3 The size of the pictograms shall correspond to the diameter of the pipe as follows :

EXTERNAL DIAMETER	PICTOGRAM SIZE	WHITE BORDER
11/2 to 21/2	Equilateral: 60 mm side	3 mm
3 to 5	Equilateral: 75 mm side	3 3/4 mm
6 and +	Equilateral: 100 mm side	5 mm

.4 The graphic symbols conform to the CAN / CSA Z321 standard.

.5 All graphic symbols will be white on a red background with a white border around the perimeter;

.6 On the temperature or pressure pictograms, the black lettering will be glued or inscribed with a marker pencil on the white rectangles.

.5 Identification of the smallest pipe size :

.1 Fix a metal plate 75 mm wide, 700 mm long and 1.5 mm thick on the pipe by means of "U" anchors, galvanized or painted, at each end on piping with diameter less than DN 1 ½ (including insulation);

.2 On uninsulated pipes, add 13 mm of unicellular elastomer between the pipe and the plate along its entire length as well as between the anchors and the pipe;

.3 Paint the plate with the appropriate base color;

.4 Glue the 60 mm side pictogram to the right end of the plate;

.5 Paint or glue the lettering and arrows on the plate. Use characters 20 mm high and arrows 100 mm long and 20 mm wide;

.6 Preformed rigid sleeve of mechanical type with attachement, color and conforming lettering wrapping around the piping.

.6 Table 1: Piping identification and identification of pictograms.

CIRCULATED MATERIAL	BASIC COLOR	PICTOGRAM	INSCRIPTION
Steam	Green	None	Steam
Purge (drainage water heater, humidifier)	Green	None	Purge
Drainage duct HVAC (shutter, coils, shed, humidification pan)	Green	None	Drainage HVAC
Cold water supply	Green	None	Cold water supply
Hot water supply	Green	None	Dom. Hw supply
Stormwater drain	Green	None	Storm
Sanitary drain	Green	None	SAN
Plumbing vent	Green	None	SAN. vent
Sump pump discharge	Green	None	Sump.

.7 Location of Identifications :
- .1 Identify the piping at the following locations :
  - .1 on both sides of wall, floor and ceiling crossed;
  - .2 at each valve except those for draining grids, convectors and plumbing fixtures;
  - .3 to access doors;
  - .4 to each branch;
  - .5 the maximum distance between the indicators will be 8 meters;
  - .6 to any other place specified by the Departmental Representative or to drawings.
- .2 When several parallel horizontal pipes pass in the same area, place the identifications in the same vertical plane;
- .3 When several parallel vertical pipes pass in the same area, place the identifications in the same horizontal plane, approximately 2 m above the floor;
- .4 On a vertical pipe, the inscription must be written from bottom to top.

2.4 VALVE AND TAPS

.1 Identification of valves :
- .1 Identify all valves using brass tags at least 30 mm in diameter and 1.5 mm thick fastened to the taps using metal chains and numbered 12 mm in height embossed;
- .2 Draw up a list approved by the Departmental Representative of valves with their number, system, location, use and normal position.
- .3 Place a laminated copy of the list in the operation and maintenance manuals;
- .4 Mount flow diagrams indicating valve number and positioning (normally open, normally closed) in a glass frame placed under the annunciator near the control panel in the mechanical room;
- .5 Number the valves consecutively in order to facilitate their use;
- .6 Provide diagrams for :
  - .1 Domestic water systems

.2 Pumping systems

.2 Locating hidden valves in the inter-ceiling :

.1 The valves concealed in an interspace must be located by a brass plate 40 mm in diameter and 1.5 mm thick fixed to the ceiling support under the valve or the group of valves using two screws retained by nuts.

PART 3 - EXECUTION

3.1 NAMEPLATES

.1 Place the plates so that they can be read easily. They must not be painted or covered with heat insulation.

3.2 EQUIPMENT AND NETWORK NAMEPLATES

.1 Location.

.1 Plates shall clearly identify appliances and piping systems in an appropriate manner and shall be placed where they will be visible to facilitate reading from the floor.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 22 05 01 : General prescriptions for plumbing.

.3 Section 22 15 01: Plumbing, gas and compressed air network

.4 Section 22 42 00 : Plumbing – Equipment, sanitary appliances and accessories.

.5 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment.

.6 Division 26 : Electricity.

1.2 REFERENCES

.1 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) :
.1 ASHRAE 111, Practices for measurement, testing, adjusting and balancing of building heating, ventilation, air conditionning and refrigeration systems.

.2 National Environmental Balancing Bureau (NEBB).

.3 Quebec Plumbing Code

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
1.13	BP	Technical product descriptions.	Before the work begins.	Letter of transmission. Recording of technical descriptions.	Contractor
1.5	MP	Notice to Departmental Representative for test schedules and operating demonstrations.	Before testing	Schedules	Contractor
1.4 1.8	BP	Tests, system settings.	Before commissioning.	Test reports	Contractor

BP : BREAKPOINT **MP** : MONITORING POINT

1.4 GENERAL REQUIREMENTS

.1 Give written notice of 72 hours prior to scheduled testing, including the names of all persons who will be present during the trials for approval by the Departmental Representative.

.2 Do not insulate or conceal the structure before it is tested and approved. Follow schedule and make arrangements for trial.

.3 Observe the recommended start-up procedures recommended by the manufacturer, unless otherwise stated.

.4 Special testing and commissioning operations may be prescribed in another section.

.5 Carry out the tests in the presence of the Departmental Representative.

.6 Before testing, disconnect all equipment or other equipment that is not designed to withstand test pressures.

.7 The contractor is required to produce a test report for each test to be performed. Use the report templates attached to this section, or the manufacturer's forms. The Departmental Representative reserves the right to refuse any incomplete report. Record all pertinent installation and operation notes including the date of testing and the dates for the correction of deficiencies.

.8 Provide the labor, materials and equipment required for the proper conduct of the tests in accordance with the prescribed codes and requirements. The Departmental Representative reserves the right to further certain tests or to require additional tests for any part of the work whose conformity with the contractual documents seems doubtful. Assume the cost of additional testing and inspections.

.9 Each test report must be signed by the person who recorded the data and the Site Manager of the Contractor and the Departmental Representative.

.10 Identify in the report all instruments used during testing and adjustment as well as the date of the last calibration of each.

.11 Provide two (2) copies of the test and inspection reports for approval without delay to the Departmental Representative. Include in the Operations and Maintenance Manual approved test reports as prescribed.

1.5 SCHEDULE REQUIRED

.1 Submit a schedule of tests and demonstrations of operation indicating the expected dates and the representatives of the competent authorities required to attend the test.

.2 Submit a schedule of training sessions.

.3 Revise schedules monthly to adopt them during the project.

1.6 TESTING

.1 Use facilities and equipment for testing prior to acceptance.

.2 The following facilities and equipment will be tested (non-exhaustive list)
- .1 Hot and cold water piping, drainage and vent pipes;
- .2 Water pumping systems (including controls).

1.7 PROCEDURE

.1 Test, adjust and balance systems. Write and deliver test report. Correct defective parts that do not comply with the specifications. Write and deliver the final test report with annotations and correction dates for each deficiency.

.2 Only carry out testing, adjustment and balancing operations when the building is largely usable where :
- .1 The installation of ceilings, doors, windows and other building elements affecting these operations has been completed:
- .2 The laying of sealing and caulking products, as well as weatherstripping is complete;
- .3 The installation and start-up of the mechanical, electrical and associated control systems affecting these operations have been completed, including, but not limited to the following:
  - .1 Thermal overload protection connected in the electrical equipment circuit;
  - .2 Fluid Networks :
    1. Washed, flushed and purged (air / water);
    2. Good direction of rotation of pumps;
    3. Appropriate filter baskets, clean and in place;
    4. Open service valves;

.3 Adjustments: The control devices must be locked in the operating position and the set points permanently marked according to the requirements of the relevant reference standard.

.4 Completion of Work: Testing and adjustment and balancing work will not be completed until final reports have been approved by the Departmental Representative.

.5 When the final test report is approved by the Department Representative, proceed to the system commissioning to demonstrate the operation and maintenance of equipment to the Department Representative prior to final inspection.

1.8 SYSTEMS TESTING

.1 Piping :
- .1 General: Unless otherwise stated, pressurize the system and ensure that no leak occurs for a period of 2 hours;
- .2 Test piping systems at a pressure equal to 1 ½ times the service pressure of the system or at a pressure of at least 700 kPa. Choose the higher of these two values;
- .3 Test the sewer, drainage and ventilation piping in accordance with the Quebec Plumbing Code and the requirements of the competent authorities. The water test will be used: the necessary measurements must be taken to conduct the tests even in periods of frost.;

.4 Test the hot water, cold water and domestic water recirculation piping at a pressure equal to 1 ½ times the service pressure of the system or at a pressure of at least 700 kPa; Choose the higher of these two values.

1.9 TRAINING OF OPERATIONS AND MAINTENANCE PERSONNEL

.1 Provide qualified instructor, tools, equipment and services to train operational and maintenance personnel in the operation, control, adjustment, diagnosis of problems and maintenance of mechanical equipment.

.2 Instructions must be given during normal working hours.

.3 Operations and maintenance manuals should be used for personnel training. At the beginning of the training period, provide four copies of the manuals to the Departmental Representative.

.4 Training courses should be based on the contents of the Operations and Maintenance Manual, the as built drawings, audiovisual materials and others.

.5 If desired, the Departmental Representative may record the training sessions on video for future reference.

.6 Unless otherwise specified in subsequent sections, personnel training will be conducted in a minimum of two (2) sessions. Session 1: Familiarization with the system, operating philosophy, performance and control sequence. Session 2: Answers to questions from the Departmental Representative, diagnoses, interviews and additional information. The first training session takes place before the systems are accepted and handed over to the Departmental Representative. The second training session is held approximately four (4) months after possession of the building by the Departmental Representative.

.7 All training sessions must be preceded by 96 hours written notice of the training date.

.8 Show how to start, operate, regularize, adjust, maintain, and detect defects in each piece of equipment.

.9 Explain to personnel all phases of operation and maintenance using operating and maintenance manuals as guides.

.10 Prepare and insert in the operation and maintenance manuals all additional data which have been collected during the training sessions, if necessary.

.11 Insert a report in the operations manual indicating the duration of the training course and the list of people present during the training sessions. The report is produced by the specialist presenting the training course.

1.10 ALLOTTED TIME FOR INSTRUCTIONS

.1 The times allocated for the instructions for each piece of equipment or system are as follows (non-limiting list) :

.1 section 22 42 00 - « Plombing - Equipment, sanitary appliances and accessories » 4 hours of training;

.2 section 23 05 48 – « Vibration and seismic controls for HVAC piping and equipment.» 2 hours of training.

.3 section 22 05 01 "Plumbing – General Prescriptions" 4 hours of training.

1.11 OPERATION AND MAINTENANCE MANUAL

.1 Provide operating, maintenance and performance records and incorporate them into the manual prescribed in 01 78 00 " Closeout submittals".

.2 The operating, maintenance and performance records must be approved by the Departmental Representative before the final acceptance, and will retain the final copies.

.3 The operating records include :
- .1 The circuit diagrams of the control / regulation circuits of each network, including the control / room control circuit;
- .2 A description of each system / installation and its control / regulation devices;
- .3 A description of the operation of each system / installation under various loads, with the set points changing program and indication of seasonal variation;
- .4 Instructions for the operation of each system / installation and component;
- .5 A description of the actions to be taken in the event of equipment failure;
- .6 A table of valves and a flow diagram;
- .7 A color chart.

.4 Maintenance records include :
- .1 Instructions for the maintenance, repair, operation and identification of defects for each piece of equipment.
- .2 Information on the periodicity of the tasks to be performed, as well as the tools and time required for all these tasks.

.5 Performance records include :
- .1 The performance data provided by the equipment manufacturer specifying the points of use of the equipment after commissioning is complete;
- .2 The results of the performance tests of the equipment;
- .3 Any other specific performance data specified elsewhere in the contract documents;
- .4 The test, adjustment and balancing reports of the systems, in accordance with the requirements of this section.

.6 Approval :
- .1 For approval, submit two (2) copies of the draft Operations and Maintenance Manual to the Departmental Representative. It is forbidden to submit entries individually;
- .2 Make the required modifications to the Operations and Maintenance Manual and resubmit it as directed by the Departmental Representative.

.7 Additional Information :
- .1 Prepare additional information sheets and attach them to the operations and maintenance manual when the demonstrations or the execution of the instructions described above show that such sheets are necessary.
- .2 All documents submitted to the Departmental Representative in paper format must also be submitted in PDF format.

1.12 AS BUILT DRAWINGS

.1 Documents to be kept on site :
- .1 The Ministry Representative will provide 1 set of mechanical drawings and indicate, as and when required, any changes made during the course of the work. This shall include changes to existing equipment and mechanical appliances, control and control systems and low voltage control wiring;
- .2 use a different colored indelible pen for each service;
- .3 Keep these drawings on-site and make them available to concerned personnel for reference and verification purposes.

.2 As built drawings:
- .1 Before beginning the tests, balancing and adjustment of the systems, complete the development of the drawings after execution;
- .2 Identify each drawing in the lower right corner, in letters at least 12 mm high, as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED AND SHOWS THE MECHANICAL SYSTEMS / APPARATUS SUCH AS THEY WERE INSTALLED ". (Signature of Contractor) (Date);
- .3 Submit the drawings to the Departmental Representative for approval, and make corrections as directed.
- .4 Carry out testing, balancing and adjustment of systems, apparatus and networks taking into account the indications in the drawings;
- .5 Submit reproducible copies of completed completed drawings, together with operating and maintenance manuals.

.3 In addition to the above, comply with the requirements of Section 01 78 00 – Closeout submittals.

.4 All documents submitted to the Departmental Representative in paper format must also be submitted in PDF format on a computer medium.

1.13 TECHNICAL PROCEDURES

.1 Submit technical procedures for carrying out tests and balancing of refrigerant networks and air ducts in accordance with the requirements of the applicable codes and standards and the requirements of this section.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 TABLE 23 05 93.1 PIPE TESTS

<table>
<tr><th colspan="2">PIPE AND EQUIPEMENT TESTING No</th><th colspan="2">(SECTION/TESTING NO)</th></tr>
<tr><td colspan="4">Test the piping in accordance with the requirements of section 23 05 93 "TESTING, ADJUSTING AND BALANCING FOR HVAC" and according to the Quebec Plumbing Code.</td></tr>
<tr><td colspan="4">Test equipment in accordance with manufacturer's instructions.</td></tr>
<tr><td>Date :</td><td></td><td>Location</td><td></td></tr>
<tr><td>Outside temperature :</td><td>[ ] °C</td><td colspan="2"></td></tr>
<tr><td rowspan="2">Attendees :</td><td>Nom :</td><td>Company :</td><td rowspan="2"></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Reference to drawings :</td><td></td><td colspan="2"></td></tr>
<tr><td>Axes :</td><td>[ ] to [ ]</td><td>Axes :</td><td>[ ] to [ ]</td></tr>
<tr><td>Section of specifications :</td><td></td><td>Description :</td><td></td></tr>
<tr><td>Description tested pipe:</td><td colspan="3"></td></tr>
<tr><td>Description of tested equipement :</td><td colspan="3"></td></tr>
<tr><td>Diameter of tested pipe :</td><td>[ ] mm</td><td></td><td></td></tr>
<tr><td>Pressure test :</td><td>[ ] kPa</td><td>Time :</td><td>[ ] h</td></tr>
<tr><td rowspan="2">Accepted test :</td><td rowspan="2">[ ]</td><td>Contractor:</td><td></td></tr>
<tr><td>Departmental Representative</td><td></td></tr>
<tr><td>Test to be repeated :</td><td>[ ]</td><td colspan="2"></td></tr>
<tr><td colspan="4">Notes :</td></tr>
</table>

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 22 05 01 : Common work results for plumbing

.3 Section 22 05 53 : Plumbing - Identifications

.4 Section 23 05 01 : Common work results for HVAC.

1.2 REFERENCES

.1 Insulate piping in accordance with the "Energy Conservation Measures in New Buildings" issued by the National Building Code Deputy Committee (NBACC) and in accordance with the "Building Energy Conservation Act" and "Regulation respecting the conservation of energy in new buildings" published by the official publisher of Québec.

.2 Degree of fire resistance :
- .1 The materials used shall conform to NFPA 90A and have a maximum flame spread of 25 and a maximum smoke index of 50 in accordance with ASTM C411, NFPA 255 and CAN4-S102-M;
- .2 The prescribed materials that have been approved for specific uses by the competent authorities will be acceptable for the execution of the present work;
- .3 Materials tested to ASTM C411 shall not ignite, ignite, glow or smoke when exposed to normal operating temperatures.

.3 American Society for Testing and Materials, (ASTM) :
- .1 ASTM C411, Standard test method for hot-surface performance of high-temperature thermal insulation.

.4 Canadian General Standards Board (CGSB) - Office des Normes Générales du Canada (ONGC) :
- .1 CGSB 51-GP-9M, Mineral Fibre Thermal Insulation for Piping and Round Ducting;
- .2 CAN/CGSB-51.12, Thermal Insulating and Finishing Cement;
- .3 CGSB 51-GP-2M, Thermal Insulation, Mineral Fiber, Sleeving for Piping and Round Ducting;
- .4 CGSB 51-GP-52M, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation;
- .5 CGSB 51-GP-11M, Thermal Insulation, Mineral Fiber, Blanket, for Piping, Ducting, Machinery and Boilers;
- .6 CGSB 51-GP-10M, Thermal Insulation, Mineral Fiber, Block or Board, for Ducting, Machinery and Boilers;
- .7 CGSB 51-GP-53M, Jacketing, Polyvinyl Chloride Sheet, for Insulating Pipes, Vessels and Round Ducts;
- .8 CAN/ CGSB-51.40-M80, Thermal Insulation, Flexible, Elastomeric, Unicellular, Sheet and Pipe Covering.

.5 Underwriters' Laboratories of Canada (ULC).

.6 National Fire Protection Association (NFPA) :
- .1 NFPA 90A, installation de système de conditionnement d'air et de ventilation;
- .2 NFPA 255, Test of surface burning characteristics of building materials.

.7 Canadian Insulation Association :
- .1 ACNOR HA;
- .2 CAN4-S102-M.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
3.1.2	MP	Certification of the workforce.	Before the work begins.	Certification of the workforce.	Contractor
1.11	BP	Technical procedures	Before the work begins.	Letter of transmission. Recording of the review of technical procedures.	Contractor
1.4	BP	Workshop drawings and / or technical descriptions of the products.	Prior to delivery, as per the requirements for submission of shop drawings or execution of the bid solicitation.	Letters of transmission. Recording of shop drawings and / or technical descriptions	Contractor
1.5	BP	Samples	Prior to delivery, as per the requirements for submission of shop drawings or execution of the bid solicitation.	Letters of transmission. Recording the sample review.	Contractor
1.12	BP	Analysis of the properties of the products.	At delivery	Certificates of analysis of properties.	Contractor
1.9	BP	Inspection of heat insulation.	At each reception.	Inspection reports	Contractor
1.10	BP	Inspection of works	According to the determined frequency.	Inspection reports	Contractor

BP :BREAKPOINT **MP** : MONITORING POINT

1.4 SHOP DRAWINGS AND TECHNICAL PRODUCT DESCRIPTIONS

.1 Submit shop drawings and / or technical descriptions of the products in accordance with Section 01 33 00 - "Submittal procedures".

.2

.3 Have the manufacturer verify the documentation provided, including methods for installing the insulation, details on the manufacture of heat insulation elements for pipes, fittings, pipes and fittings, as well as recommendations on joint execution and lining Before submitting it to the departmental representative.

1.5 SAMPLE

.1 Submit samples in accordance with Section 01 33 00 "Submittal procedures".

.2 Submit a complete set of each proposed type of thermal insulation complex including the heat insulating material proper, the coating plaster and the glue. Place the sample on a 12 mm plywood panel. Place, under the sample, a typewritten label indicating the type of service.

1.6 DEFINITIONS

.1 Hidden elements: Isolated mechanical elements located in trenches, niches, floor or wall voids, ducts or above suspended ceilings.

.2 Apparent elements: elements that are not concealed (as defined in 1.5.1).

.3 Exterior elements: elements located outside the building.

1.7 DESCRIPTION OF SYSTEMS TO BE INSULATED

.1 See part 2.

1.8 COMPATIBILITY OF COMPONENTS

.1 All mechanical anchors, adhesives, sealants, spray coatings, sealants, heat insulation and sealants must be compatible with the materials to be insulated. Consequently, they must not soften, corrode or attack these materials, either wet or dry. Apply these products within the ambient temperatures recommended by the manufacturer.

1.9 INSPECTION ON DELIVERY

.1 Inspect insulation and fittings for delivery at the site and submit inspection reports.

1.10 INSPECTION OF WORKS

.1 Inspect the installation of insulation at the end of the work. At each inspection, submit an inspection report including, but not limited to, the following information:
- .1 The scope of the audited work;
- .2 Verification of concealed installations;
- .3 Checking the installation of insulation in accordance with the manufacturer's recommendations;

1.11 TECHNICAL PROCEDURES

.1 Before beginning work, provide technical procedures for the installation of the following equipment :
- .1 Insulation Installation.
- .2 Any other procedure required

1.12 ANALYSIS OF PRODUCT PROPERTIES

.1 Before beginning work, provide an analysis of the properties of the products comprising on the following elements
- .1 Thermal insulator;
- .2 Vapor barrier;
- .3 Liner;
- .4 Any other product used.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCTS

2.1 INSULATION THICKNESS FOR PIPING

.1 Any piping in which fluid flows below 15 ° C or above 40 ° C shall be provided with a heat insulation as specified in the following table except for domestic cold water piping where the thickness of the insulation Will be 25 mm if P-1 type insulation is used. The thicknesses of insulation types P-2 and P-3 are given in sections 2.3 to 2.4.

		INSULATION THICKNESS (mm)				
Saturated Steam Pressure KPAG	FLUID TEMPERATURE IN °C	NOMINAL DIAMETER OF PIPELINES				
		DN 1 and -	DN 1¼ to DN 2	DN 2½ to DN 4	DN 5 DN 6	DN 8 and +
380 to 3 275	151 - 240	64	64	76	89	89
104 to 379	121 - 150	51	64	64	76	76
to 100	96 - 120	38	38	51	51	51
	40 - 95	25	25	38	38	38
-	5 - 15	13	25	25	25	25
Cooled Fluid	Less than 5	25	38	38	38	38

.2 Domestic cold water piping, roof and vent pipe drains are not subject to the above table for insulation thicknesses.

.3 If the thickness required in the table above does not exist for a given diameter, then install the upper thickness eg. : For a DN 15 "pipe at an operating temperature of 10 ° C, the panel requires a thickness of 25 mm. If not available, install a thickness of 38 mm.

2.2 TYPE P-1

.1 Uses: Type P-1 insulation for pipes, valves and fittings used in the following cases :
- .1 Steam and drainage piping for humidifiers, operating temperature of 121 ° C;
- .2 condensate piping, low and high pressure, operating temperature 94 ° C;
- .3 domestic hot water piping, operating temperature 60 ° C;
- .4 domestic cold water piping, operating temperature 5 ° C;
- .5 Plenum drain piping, purlins, etc., operating temperature 4 ° C.

.2 Material :
- .1 Rigid shell of mineral fibers conforming to CGSB 51-GP-9M with vapor barrier, liner and coating material conforming to CGSB 51-GP-52M.

.3 Thermal insulation having a thermal resistivity of 28 to 32 m. Degree C / W and designed for an ambient temperature of 15 to 32 degrees C. Insulation thickness according to 2.1.

2.3 TYPE P-2

.1 Uses: for pipes and fittings with operating temperature between 14 ° C and 200 ° C, used in the following cases :
- .1 To protect the surface of the body of the roof drains, the drainage pipes of the drains up to 1 m from the vertical descent to the lower level including the entire horizontal part and the vents for a distance of 6 m from of the roof in all directions.

.2 Material
- .1 Fiberglass mattress (for insulation of piping), in accordance with CGSB 51-GP-11M and amendment of April 1978, with vapor barrier, liner and coating material in accordance with CGSB 51-GP-52M and a thermal resistivity of 26 m - degree C / W.

.3 insulation thickness: 25mm.

2.4 TYPE P-3

.1 Uses: for pipes, valves and fittings installed outside and inside above grade, used in the case of the following systems :
- .1 Gas piping and hot refrigeration liquid outside and inside the building.
- .2 Material: flexible, elastomeric, unicellular, sheet and tubular insulation conforming to CAN / CGSB-51.40-M80 and the amendment of August 83.

.2 Thickness of insulation :

DIAM. NOMINAL DES CANALISATIONS (DN)	THICKNESS OF INSULATION (MM)
2 and less	12
2 1/2 to 3	19

2.5 FIXATION ACCESSORIES

.1 A 100 mm wide self-adhesive tape with a flame spread of 25 or less and a smoke index of 50 or less.

.2 Adhesive:
  .1 Contact adhesive :
    .1 Quick-setting adhesive for sealing joints and seams of unicellular flexible insulations;
  .2 Adhesive to seal the overlaps :
    .1 Quick-setting adhesive for sealing joints and vapor barrier overlaps;
  .3 Adhesive for heat insulating lining in canvas :
    .1 Washable adhesive used to glue the heat insulating lining in canvas to the heat insulating material;

.3 Brace :
  .1 Stainless steel wire annealed soft 1.2 mm diameter, type 304;
  .2 Mesh with 25 mm hexagonal mesh, 0.9 mm thick, type 304 in stainless steel;
  .3 Galvanized steel belt, measuring 12 x 0.4 mm;
  .4 aluminum strips.

2.6 LINER

.1 Aluminium :
  .1 Aluminum casings according to CSA HA. Series M: used on all exterior insulated elements:
    .1 Corrugated or embossed aluminum alloy liners, 0.4 mm thick, with longitudinal sliding joints and 50 mm wide overlapped end joints, with an interior surface coated in the factory with a coating Protectors, also equipped with aluminum alloy covers, with metal fasteners;
    .2 Liners, die-cast aluminum alloy 0.4 mm thick, with an interior surface coated with a protective coating in the factory;

.2 PVC liner :
  .1 PVC liner according to CGSB 51-GP-53M standard: used on all interior insulated elements, including mechanical room :
    .1 PVC liners at least 0.38 mm thick;
    .2 Insulating sleeves for fittings: one-piece, pre-molded and conforming to the insulation;
    .3 brace: current model supplied by manufacturer;

PART 3 - EXECUTION

3.1 INSTALLING

.1 Install the insulation material after completion of the leakage tests and the report of results approved by the ministry representative. Ensure that the surfaces of the insulation and insulation elements are clean and dry during laying and during the application of a finish coat.

.2 Have the work performed by skilled insulation workers and a member of the Canadian Insulation Association..

.3 Install the heat insulating material and the vapor barrier continuously over the entire length of the pipe or duct and over the entire surface to be insulated. The insulation material and the vapor barrier shall not have openings for the passage of the elements, supports and suspensions or be interrupted at the location of the sleeves and fittings or protruding joints.

.4 In the case of piping covered with insulation and a vapor barrier, install protective saddles for insulated pipes in front of the supports. The vapor barrier must not be drilled.

.5 Place the insulating material in order to achieve a smooth and even surface, according to the rules of art.

.6 Apply heat-insulating material and apply coatings and finishes as recommended by the manufacturer.

.7 Apply a flame retardant coating on canvas liner.

.8 Do not interrupt the aluminum lining in front of the supports.

.9 Outside, install a rigid insulation with protective shield before the supports.

3.2 INSULATION MATERIAL FOR P TYPE

.1 Preformed insulation: use a heat insulator with cylindrical elements for piping with a diameter of DN 12 or less, and a heat insulator with cylindrical elements or hinged shells for piping with a diameter greater than DN 12.

.2 Multi-thickness insulation: offset the abutting joints of each insulation thickness.

.3 Vertical piping larger than DN 3: use insulation brackets that will be welded or bolted to pipes directly above the lowest fitting and then 4.5 m apart.

.4 At the location of the expansion joints: cut the end of each insulation thickness as per the manufacturer's instructions. Leave a vacuum of 25 mm between two successive sections, and fill the voids with mineral fibers.

.5 In the case of valves, fittings and equipment, parts and subassemblies of which must be checked and maintained periodically, use a factory-made and easily removable insulation.

.6 At each end of the union and flange connections, hot water lines and other locations, seal the insulation with CAN / CGSB-51.12 compliant cement, trowel spread and beveled.

.7 Make grooves in the heat-insulating material so that it can follow the shape of the weld seams. Cut the beveled material at the location of the studs and nuts so that these elements can be removed without damaging the insulation; Precisely cut it around the protruding elements of the brackets, suspensions, brackets and clamps and seal it with insulating cement.

.8 Do not install heat insulation :
- .1 On tap fittings, fittings and flanges of low-temperature hot water installations (60 ° C and below);
- .2 On sanitary sewer piping, with the exception of vents;
- .3 On chrome plumbing for sanitary fittings

.9 All valves, flanges, valves, fittings, sieves, etc. shall be insulated by mitered insulation segments or fiberglass wool equal in thickness to that of the adjacent pipe. Cover with a 3 mm thick layer of insulating cement mixed with 25% Portland cement. Cover with a canvas and a layer of plaster for hot networks, 40 ° C and more. For cold networks, cover with an antifouling sheath with seals sealed with adhesive.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 : Cast-in-place concrete.

.2 Section 22 05 01 :Common work results for plumbing.

.3 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment

.4 Division 26 : Electricity.

1.2 REFERENCES

.1 Conseil national de recherches du Canada (CNRC)/Institut de recherche en construction
- .1 CNRC 38728F, Code national de la plomberie - Canada (CNP) ;

.2 Plumbing and Drainage Institute (PDI) :
- .1 PDI-WH 201, Water hammer arresters.

.3 American Society for Testing and Materials, (ASTM) :
- .1 ASTM A47/A47M, Standard specification for ferritic malleable iron castings;
- .2 ASTM A53/A53M, Standard specification for pipe, steel, black and hot-dipped, zink-coated, welded and seamless;
- .3 ASTM A 181/A 181M, Standard Specification for Carbon Steel Forgings for General Purpose Piping.
- .4 ASTM A234/A234M, Standard specification for piping fittings of wrought carbon steel and alloy steel for moderate and high temperature service;
- .5 ASTM A307, Standard specification for carbon steel and studs, 60 000 PSI tensile strength;
- .6 ASTM A 536, Standard Specification for Ductile Iron Castings.
- .7 ASTM B306, Standard specification for copper drainage tube (DWV);
- .8 ASTM B88/B88M, Standard specification for seamless copper water tube;
- .9 ASTM B75, Standard specification for seamless copper tube.

.4 Candian Standard Association (CSA) :
- .1 CSA C22.2, Canadian Electrical Code Part II-General Requirements;
- .2 CSA B51, Boiler, pressure vessel, and pressure piping code;
- .3 CSA B64, Backflow preventers, and vacuum breakers;
- .4 CSA B70, Cast Iron soil pipe, fittings and means of joining;
- .5 CSA B181.2, PVC drain, waste, and vent pipe and pipe fittings;
- .6 CSA B181.12, Recommended practice for the installation of PVC drain, waste and vent pipe fittings;
- .7 CAN/CSA B149.2, Natural gas and propane installation code handbook;
- .8 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .9 CAN/CSA W-59, Construction soudée en acier (soudage à l'arc).

.5 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

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

.7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS-SP-67, Butterfly Valves.
- .2 MSS-SP-70, Gray Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
- .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.8 Canadian General Standards Board (CGSB).

.9 American National Standards Institute (ANSI)/ American Society of Mecanical Engineer (ASME):
- .1 ASME Boiler and Pressure Vessel Code Section VIII Pressure Vessels.
  - .1 BPVC-VIII B , BPVC Section VIII - Rules for Construction of Pressure Vessels Division 1.
  - .2 BPVC-VIII-2 B , BPVC Section VIII - Rules for Construction of Pressure Vessels Division 2 - Alternative Rules.
  - .3 BPVC-VIII-3 B , BPVC Section VIII - Rules for Construction of Pressure Vessels Division 3 - Alternative Rules High Press Vessels.
- .2 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.
- .3 ANSI/ASME B16.11, Forged Fittings, Socket-Welding and Threaded.
- .4 ANSI H23.6, Copper tube, drainage DWV;
- .5 ANSI H23.1, Copper pipe, water, seamless, type K,L;
- .6 ANSI A21.51, Ductile – iron pipe;
- .7 ANSI A 21.4, Standard for cement-mortar lining for ductile-iron pipe and fittings for water;
- .8 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
- .9 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
- .10 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .11 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .12 ANSI B16.23a, Cast copper alloy solder joint drainage fittings – DWV;
- .13 ANSI B16.22, Wrought copper and copper alloy solder joint pressure fittings;
- .14 ANSI B16.3, Malleable iron screwed fittings 150 lbs.

.10 American Water Works Association (AWWA) :
- .1 AWWA C110/A21.10, Ductile-iron and gray-lorn fittings for water;
- .2 AWWA C111/A21.11, Rubber gasket joints for ductile-iron pressure pipe and fittings.

1.1 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
	BP	Workshop drawings in accordance with section 22 05 01.	Prior to delivery, as per requirements for submission of shop drawings or bidding execution.	Letter of transmission. Recording of technical descriptions.	Contractor
1.4	BP	Seismic qualification certifications from the manufacturer.	Accompany the shop drawings of the devices.	Seismic Qualification Certifications	Contractor
	BP	Attestation of conformity in accordance with Section 22 05 01.	At the delivery	Documents of attestation of conformity.	Contractor
1.7	BP	Inspection of plumbing and compressed air equipment.	At each reception	Inspection reports	Contractor
	BP	Notice to department representative for underground piping inspection.	Before the pouring of the concrete.	Breakpoint	Contractor
1.5	BP	Network testing	Before installation of thermal insulation and start-up.	Test reports	Contractor
	BP	Notice to the Department for inspection of concealed piping.	Before closing the walls.	Breakpoint	Contractor
1.6	BP	Technical procedures	Before commissioning	Letters of transmission. Registration of technical product review.	Contractor
1.8 1.7	BP	Inspection of plumbing and compressed air systems	Depending on the frequency	Inspection reports	Contractor

BP : Breakpoint **MP** :MONITORING POINT

1.2 SEISMIC QUALIFICATION CERTIFICATION

.1 Seismic Qualification Certification: Provide certification that equipment, components and accessories will withstand seismic forces as defined in Section 23 05 48 - " Vibration and seismic controls for HVAC piping and equipment ". Include the following

.1 Basis of seismic certification: Indicate whether the certification is based on tests or calculations.

.1 The term "resistance" means that "the apparatus shall remain in place without any of its parts dissociating from the unit when subjected to the specified seismic forces and the unit will be fully functional after the seismic event. ".

.2 Dimensional drawings of the device: Identify the center of gravity, locate and describe the mounting and anchoring devices;
.3 Detailed description of the anchorage devices of the apparatus on which the certification is based and their installation requirements.

1.3 TEST REPORTS

.1 Perform water leakage and drainage leak testing in accordance with applicable Plumbing Codes and CAN / CSA B149.2.

1.4 TECHNICAL PROCEDURES

.1 Submit technical procedures for disinfection of the water supply system.

1.5 INSPECTION ON DELIVERY

.1 Inspect plumbing fixtures and fittings for delivery at the site and submit inspection reports.

1.6 INSPECTION OF WORK

.1 Inspect the plumbing fixtures at the completion of the work. At each inspection, submit an inspection report including, but not limited to, the following information :
  .1 the scope of work audited;
  .2 The verification of the type of materials used according to the applications;
  .3 Verification of the rafters;
  .4 Verification of slopes;
  .5 Verification of concealed installations;
  .6 Spacing of fixation (supports);
  .7 Welding;
  .8 For the installation of underground piping, checking the foundation bed of the piping;
  .9 The connection of each system according to the manufacturer's recommendations;

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCTS

2.1 DRAINAGE AND VENT

.1 Aboveground :

.1 PVC (to be used anywhere, except as described below)

	DIAMETER DN		CLASS/ CALIBER	DESCRIPTION	STANDARDS
	FROM	TO			
PIPE	1-1/2"	24"	DWV	PVC – IPEX SYSTEM XFR	CSA B181.2
ASSEMBLY	1-1/2"	24"	---	Solid or socket ends	CSA B181.2
CONNECTIONS	1-1/2"	24"	DWV	PVC – IPEX SYSTEM XFR Enclosing socket ends	CSA B181.2 ASTM D2466 ASTM D2467

.2 Copper (drainage of plenums, condensate purges, humidifiers, water heaters, DARs, expansion tanks, etc.)

	DIAMETER DN		CLASS / CALIBER	DESCRIPTION	STANDARDS
	FROM	TO			
PIPE	3/4"	2 ½"	DWV	Copper	ANSI H23.6 ASTM B306
ASSEMBLY	3/4"	2 ½"	---	Brazing 95% tin / 5% antimony	
CONNECTIONS	3/4"	2 ½"	---	Bronze cast Soldering end-fittings	ASME B16.23

.3 Underground :

.1 PVC :

	DIAMETER DN		CLASS / CALIBER	DESCRIPTION	STANDARDS
	FROM	FROM			
PIPE	1-1/2"	24"	DWV	PVC-IPEX SYSTEM 15	CSA B181.2
ASSEMBLY	1-1/2"	24"	---	Solid or socket ends	CSA B181.2
CONNECTIONS	1-1/2"	24"	DWV	PVC- IPEX SYSTÈME 15 Enclosing socket ends	CSA B181.2
CHECK VALVE	1-1/2"	24"	---		

2.2 DOMESTIC WATER

.1 Aboveground :
.1 Copper :

	DIAMETER DN		CLASS / CALIBER	DESCRIPTION	STANDARDS
	FROM	TO			
TUYAUX	3/8"	4"	Type "L"	Rigid copper	ASTM B88
ASSEMBLY	3/8"	2"	---	Alloy brazing 95% tin / 5% antimony	ASTM B32
	2½"	4"	---	Welded with Sil-fos 5%	
CONNEXIONS	3/8"	4"	---	Forged copper Soldering end-fittings	ASTM B584 ANSI B16.22
UNIONS	3/8"	2"	---	Forged copper Soldering end-fittings	ANSI B16.22
FLANGE	2½"	4"	150	Bronze flange Plug-in end to braze	ASTM B584 ANSI B16.24
BOLT AND NUTS	---	---	---	Steel hexagon bolt Plated with zinc.	ASTM A193/A193M Grade B7
	---	---	---	Hexagonal steel nut Plated with zinc	ASTM A194/A194M Grade 2H
SEAL	---	---	---	Asbestos-free synthetics Minimum thickness of 1.5 mm	ANSI B16.21
GATE VALVE	3/8"	2"	1380 kPa * WOG	Bronze body Threaded ends	MSS-SP-80
	2½"	4"	1380 kPa * WOG	Cast iron body Flanged ends class 125	MSS-SP-70
GLOBE VALVE	3/8"	2"	2070 kPa* WOG	Bronze body Threaded ends	MSS-SP-80
	2½"	4"	1380 kPa * WOG	Cast iron body Flanged ends class 125	MSS-SP-85

	DIAMETER DN		CLASS / CALIBER	DESCRIPTION	STANDARDS
	FROM	TO			
CHECK VALVES	3/8"	2"	2070 kPa* WOG	Bronze body Threaded ends	MSS-SP-80
	2½"	4"	1380 kPa * WOG	Cast iron body Flanged ends class 125	MSS-SP-71
CHECK VALVES VERTICAL INSTALLATION	3/8"	2"	1725 kPa* WOG	Bronze body Threaded ends	MSS-SP-80
	2½"	4"	125	Cast iron body Stainless steel disc and spring.	
SPHERICAL VALVES	3/8"	2"	1050 kPa* WOG	Bronze body Threaded ends	MSS-SP-110
BALANCING VALVES	1/4"	2"	2070 kPa* WOG	Bronze body Threaded ends	MSS-SP-80

* Water pressure
W.O.G. (Water, Oil, Gaz)

.2 Underground :

.1 Copper :

	DIAMETER DN		CLASS/ CALIBER	DESCRIPTION	STANDARDS
	FROM	TO			
PIPE	½"	2"	Type "K"	Cuivre flexible	ASTM 88
ASSEMBLY	½"	2"	---	Soudé, soudure à l'argent	
CONNECTIONS	½"	2"	---	Cuivre forgé	ANSI B16.22

.2 Welding :

.1 Alloys used for welds in drinking water piping, whether underground or not, must contain less than 0.2% of lead.

2.3 VALVES

.1 All valves of the same type must come from a single manufacturer, ie all cast-iron valves must come from a single manufacturer and all bronze valves must also come from a single manufacturer maker.

.2 The valves are indicated to the piping standards.

2.4 SPECIAL EQUIPMENT

.1 Water-hammer arrester :
- .1 Provide water hammer arresters conform to the PDI-WH Standard 201 "Plumbing and Drainage Institute," and install the power connections of each unit, hot and cold.
- .2 The size of the water hammer arresters must comply with the PDI-WH standard 201

.2 Water purge valves :
- .1 The faucet spout must be threaded to receive the hose fitting. The faucet must be equipped with a replaceable plastic disc, be of unfinished brass and have a vacuum breaker, a plug and chain:

.3 Compression sealing sleeves :
- .1 Watertight mechanical seal with rubber elements between 2 pressure plates made of stainless steel. Stainless steel bolts. For sealing pipes through a wall. When compressed, the rubber seals both the piercing through the foundation and the space between the pipe and the sleeve.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING

.1 General information :
- .1 Install piping in a straight line near walls and ceilings and parallel to these surfaces. Regulate the slope of the piping in accordance with the regulations. Use standard fittings when piping changes direction;
- .2 Placing the pipe groups parallel to one another; Space them so as to facilitate thermal insulation, pipe identification, maintenance and repairs. Fit hoses on trapezoidal hose clips;
- .3 When the diameter of the pipes differs from the diameter of the fittings of the equipment, install gearboxes on the equipment. It is prohibited to use reduction sleeves;
- .4 Brass and copper pipes and tubes shall not be damaged; If not, replace them;
- .5 Bore the ends of the pipes before connecting;
- .6 Place the copper tubes so that they do not come into contact with a different metal and are not bumpy or flattened;
- .7 Use a non-corrosive lubricant or Teflon tape to cover the thread;
- .8 For pipes with fluted ends: cut the pipes of square; The contact surface shall be clean and free from any notches;
- .9 Install flanges or union-joints so that equipment can be removed without having to move the piping;
- .10 Clean the ends of the pipes or tubes and the cavities of the fittings to be soldered or welded. Attach parts without jamming.

.2 Apparatus evacuation devices :
- .1 Install evacuation valves at all low points;
- .2 Extend the appliance drain hoses so that water can flow into a floor or drain;
- .3 Unless otherwise specified, install a drain pipe connecting the drainage basin of the aeraulic appliances; This pipe must have the same diameter as the outlet fitting of the equipment and be fitted with a siphon with a water guard above the total static pressure of the ventilator.

.3 Dilatation and contraction :
- .1 Flexible fittings, loops and deviations, as indicated;
- .2 Fix the piping in such a way as to avoid any stress or tension;
- .3 Use anchoring devices made of steel, welded to steel pipes, fixed by means of greenhouses to non-ferrous pipes, fixed to the building framework or embedded in a concrete pillar. Determine location of attachment points with departmental representative;
- .4 Fix horizontal brass or copper pipe to wall or floor. Determine the location of the anchorages with the departmental representative and obtain approval for each type.

.4 Wastewater and rainwater drainage :
- .1 Connect the piping to the sewer pipes with a uniform slope. Provide a siphon and a vent as required;
- .2 When the slope of the raft is not specified, the piping must have a uniform slope of 1:50;
- .3 Plug pipes and fittings with plugs or caps so that no debris enters the interior during construction;
- .4 Seals: use a material that is compatible with the type of pipe specified in the pipe.

.5 Embedded interior piping :
- .1 Lay the pipes on a bed of clean, compacted and clean sand, free from clay, snow, ice, organic matter or stone;
- .2 It is forbidden to lay the pipes in the water or to proceed with the installation when the department representative considers that the conditions are unfavorable;
- .3 The buried drain pipes must be positioned to allow a clearance of at least 200 mm below the bottom surface of the concrete slab.

.6 Water pipes :
- .1 The water lines must connect the service connections to equipment and outlet pipes;
- .2 A pressure gauge must be mounted on the main line of the public grid downstream of the water meter. Install a manometer valve between the main line and the pressure gauge;
- .3 The sanitary fixtures in washrooms and all connections to the mainline must be equipped with shut-off valves. Install a shut-off valve on each supply line.;
- .4 Supply and install hose threaded valves or drain valves for draining all systems;

3.2 CLEANING

.1 The systems must be presented in working order. The places where they are installed must be clean, in accordance with the requirements of the department representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 22 05 01 :Common work results for plumbing.

.2 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment

.3 Division 26 : Electricity.

1.2 REFERENCE

.1 Office des Normes Générales du Canada (ONGC) - Canadian General Standards Board (CGSB).

.2 Canadian Standard Association (CSA) :
- .1 CSA C22.2 n° 110, Construction and Test of Electric Storage-Tank Water Heaters;
- .2 CSA B45, Plumbing fixtures;
- .3 CSA B64, Selection and installation of backflow preventers;
- .4 CSA B51, Boiler, pressure vessel, and pressure piping code;
- .5 CSA B79, Floor, area and sower drains, and cleanouts for residential construction;
- .6 CSA B125, Plumbing fittings;
- .7 CSA-C191, Performance of Electric Storage Tank Water Heaters for Household Service;
- .8 CAN/CSA B149.2, Natural gas and propane installation code handbook;

.3 American Society of Mechanical Engineer (ASME) :
- .1 ASME SB75/ASTM B75, Standard for Seamless copper tube;
- .2 ASME SB111/ASTM B111, Copper and copper alloy seamless condenser tubes and ferrule;
- .3 ASME A 112.21.1M, Floor drains.

.4 American Society for Testing and Materials, (ASTM) :
- .1 ASTM A516/A516M, Standard specification for pressure vessel plates, carbon steel, for moderate- and lower-temperature service.

.5 National Building Code of Canada (CNBC).

.6 Conditioning and Refrigeration Institute (ARI) :
- .1 ARI 101-73;
- .2 ARI 1010, Drinking-fountains and self-contained, mechanically-refrigerated drinking-water coolers;
- .3 ARI 1020, Application and installation of drinking fountains and drinking water coolers.

.7 Underwriters' Laboratories of Canada (ULC).

.8 Règlements des lois provinciales sur l'énergie.

.9 Food and drug administration (FDA).

.10 Tubular Exchanger Manufacturers Association (TEMA).

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE					
ART.	**BP/MP**	**PRESCRIPTIONS**	**MOMENT**	**RECORDS**	**RESPONSABILITY**
	MP	Certification of the workforce.	Before the work begins.	Certification of the workforce.	Contractor
1.4	BP	Seismic qualification certifications from the manufacturer.	Accompany the shop drawings of the devices in question.	Seismic qualification certifications from the manufacturer.	Contractor
	BP	Workshop drawings and / or technical product descriptions in accordance with Section 22 05 01.	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation	Letters of transmission. Recording of shop drawings and / or technical descriptions.	Contractor
	MP	Attestation of Conformity in accordance with Section 22 05 01.	At delivery	Documents of attestation of conformity.	Contractor
1.5	BP	Inspection of sanitary equipment and appliances.	At each reception.	Inspection reports	Contractor
	BP	Advise the department representative for the installation of equipment installed in	Before permanently insulating and / or concealing appliances.	Break points	Contractor
1.5 1.6	BP	Inspection of works	According to the determined frequency.	Inspection reports	Contractor

BP : BREAKPOINT **MP** : MONITORING POINT

1.4 SEISMIC QUALIFICATION CERTIFICATION

.1 Seismic Qualification Certification: Provide certification that the equipment, components and accessories thereof will withstand the seismic forces defined in Section 23 05 48 - Antivibration and Seismic Systems and Devices for Piping and HVAC Devices. Include the following:
  .1 Basis of seismic certification: Indicate whether the certification is based on tests or calculations;
    .1 The term "resistance" means that "the apparatus shall remain in place without any part of it dissociating from the unit when subjected to the specified seismic forces and the unit will be fully functional after the seismic event."
.2 Dimensional drawings of the device: Identify the center of gravity, locate and describe the mounting and anchoring devices;
.3 Detailed description of the anchor devices of the device on which the certification is based and their installation requirements.

1.5 INSPECTION ON DELIVERY

.1 Inspect all sanitary equipment and accessories on site delivery and submit inspection reports.

1.6 INSPECTION OF THE WORK

.1 Inspect the plumbing fixtures at the completion of the work. At each inspection, submit an inspection report including, but not limited to, the following information :
- .1 The scope of the audited work
- .2 The fasteners (brackets);
- .3 Verification of concealed installations;
- .4 Checking the installation of insulation in accordance with the manufacturer's recommendations;

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCTS

2.1 FLOOR DRAIN DPE

.1 DPE1 :
- .1 Install Trap Guard » in all floor drain.

2.2 CLEANOUT

.1 Provide cleaning gates and install them at the bottom of all fall and sewer columns, and all rain columns and at all locations prescribed by the codes and where indicated on the drawings. Manholes should be placed as far as possible so that they can be embedded in the wall rather than in the floor.

.2 Type: ferrule with male end in robust cast iron with brass screws and threaded conical stopper in bronze; Seat in lead, waterproof and caulked.

.3 In all cases, manholes shall be fitted with a watertight plug.

.4 Lids or access plates :
- .1 for concealed or buried surfaces;
- .2 Wall installation: look of wall or wall type, polished nickel bronze square cover, with recessed head mounting screw and beveled edge frame, with fixing brackets;

.5 floor installation: cast iron rectangular frame, with mounting brackets :
  .1 For concrete floor :
    .1 Molded brass cleanout, with hinged scoriace lid and vandal proof locking screws;
  .2 for tile and linoleum flooring :
    .1 Polished brass look with built-in lid that can be covered with tiles or linoleum and has vandal-resistant locking screws

2.3 WATER HEATER

.1 water heater
  .1 CSA compliant oil-fired water heater
  .2 Power 26.4 Kw (90,000 BTU / h). Oil flow: 2.4 to 2.8 l / h (0.65-0.75 USG / h)
  .3 Storage capacity: 121 liters (32 gallons).
  .4 Connected to existing chimney.

2.4 SANITARY FITTINGS AND ACCESSORIES - GENERAL

.1 Sanitary appliances of the same type (ex : for floor drains) must all come from the same manufacturer and be of the same color.

.2 Unless otherwise indicated, plumbing fixtures must all come from the same manufacturer.

.3 Refer to the architectural drawings for the number of devices required and their location.

.4 Materials
  .1 Vitreous porcelain in accordance with CSA B45;
  .2 Unless otherwise specified, stainless steel appliances must comply with CSA B45, Class II, Type 302; For use in photography and laboratory use, they shall be class I, type 316;
  .3 Plumbing fittings in accordance with CSA B125;
  .4 Brass fittings and exposed metalwork shall be covered with three layers of chromium.

2.5 WATER CLOSET (CA)

.1 CA1 (mounted on the floor, with valve):
  .1 White vitreous porcelain combination bowl, jet trap, with elongated edge, self - draining jet, model for floor mounting with bolt caps. White vitreous porcelain tank with flap-type flushing mechanism and interior trim to prevent condensation;
  .2 Open front seat, raised 50 mm with lid, made of extra strong solid plastic, for bowl with elongated edge. Bumper hinges, integrated bumpers, corrosion-resistant fixing rods;
  .3 Supply piping with flush valve and double flush, chrome finish and low consumption;

2.6 BATHROOM SINK (LA1)

.1 LA1 (Counter-top): vitrified porcelain with integrated edge, overflow opening at the front, rear exit, oval:
  .1 Supply and drain: single-handle tap, combined supply and drain connection, mixing spout, removable seats, flapper valve, aerator and joysticks identified;

2.7 PORTABLE EYEWASH (LY1)

.1 LY1 / portable eyewash :
- .1 Portable ocular shower operated by gravity. FDA-compliant high density polyethylene tank with a minimum volume of 60.6 L and capable of maintaining a minimum flow rate of 1.5 L / min for 15 minutes.
- .2 Waterproof additive to eliminate the growth of bacteria.

PART 3 - EXECUTION

3.1 INSTALLATION OF SANITARY APPLICANCES

.1 Install level and angle sanitary fixtures, support and connect pipes and accessories for supply and drain, and their siphons. The hot water faucets must be placed on the left side. Sanitary appliances attached to external walls must be fed by pipes passing through the floor while all the others must be supplied by pipes concealed in the wall.

.2 The different mounting heights of wall-mounted sanitary fixtures measured from the finished floor shall comply with the following requirements:
- .1 Standard mounting height: unless otherwise stated or specified, depending on the installation details of the service leads supplied by the manufacturer
- .2 height of fitting for persons with disabilities: as per CNBC requirements.

.3 Provide chrome-plated semi-flexible supply lines equipped with hand-operated shut-off valves, reducers and flanges, and connect them to sanitary fixtures.

.4 Provide the required brackets so that the sanitary fixtures are level and angled. Install the devices so that they can withstand a mass of 90 kg without losing their solidity. Secure appliances to walls or partitions using 12 mm nominal diameter support bolts through the wall and threaded into a 3 mm thick steel plate on the opposite side of the wall or embedded in the latter, if necessary, except when support arms are prescribed.

.5 Sanitary appliances installed on vitrified floor tiles must have their undersurface ground at the point of contact with the tiled surface.

.6 Connect and install appliances or connect only those already fitted to the kitchen equipment specified in other sections.

.7 Provide and install water hammer arrestors for each fixture or group of devices.

.8 When the drawings indicate outlets for the connection of other sanitary appliances, plug the outlets with gas-tight and water-tight plugs or caps. Fill openings in walls using stainless steel covers secured with flat head screws.

3.2 CLEANOUT

.1 Install cleaning holes at the bottom of all wastewater and storm drains, as well as at all other locations prescribed in the code or shown in the drawings.

.2 Install flush cleaning gaps with the finished wall or floor unless it is floor-mounted and can be reached for service from a place under the floor.

.3 The diameter of the cleaning gaps mounted on the main manifolds and the drainage columns must be equal to that of the pipeline, but must never be greater than DN 4.

3.3 FROST-PROOF WALL OUTLETS

.1 Unless otherwise indicated, install the wall outlets to a height of 600 mm above the finished floor level.

3.4 WATER HAMMER

.1 Install a water hammer on the supply lines connected to each fixture or each group of fixtures as well as the locations indicated.

3.5 NON-RETURN VALVE

.1 Install a non-return valve at the locations indicated. Install check valves in access pits as indicated.

3.6 DRAW-OFF VALVES AND DRAIN VALVES

.1 Install draw-off / drain valves at the bottom of all risers, low points connected to the drainage systems and at the locations indicated.

3.7 TESTING AND SANITATION

.1 Testing: Ensure that insulated pipes and equipment installed in concealed areas are inspected and inspected before insulation or permanent concealment. Inform the Ministry representative in writing 48 hours in advance.

.2 Sanitation: to clean up the drinking water system in accordance with the requirements of the competent authorities. Provide the chemicals and perform the flushes necessary for this purpose.

3.8 INSTALLATION OF APPLIANCES

.1 Connect the appliances to the hot and cold water lines, and the exhaust pipe from the relief valve to the floor.

.2 Water Heater: install water heaters in accordance with manufacturer's instructions and connect them to hot and cold water lines, connect discharge from relief valve to nearest floor return.

.3 Control Valve: Install required water flow control valves on supply line to tank, appliances and water heater, in accordance with manufacturer's instructions.

END OF SECTION

PART 1. GENERAL

1.1. GENERAL

1. Electrical, structural, architectural and civil engineering plans and specifications form an integral part of the mechanical specifications as if they were reproduced at length.

2. The Contractor shall familiarize himself with the type of construction proposed by carefully examining the plans and specifications for architectural, structural, electrical and civil engineering work.

3. No additional remuneration will be granted for work not planned but required by the type of construction.

1.2. RELATED REQUIREMENTS

1. Section 01 33 00 — Submittal procedures.

2. Section 01 74 11 – Cleaning.

3. Sections of division 23.

1.3. MATERIALS: IMPLEMENTATION REQUIREMENTS

1. Through the use of union and flange connections, ensure that maintenance and dismantling of equipment and equipment can be accomplished by moving the piping and ducts connected to it as little as possible; Ensure that the building's components and framing or other facilities do not constitute an obstacle to the execution of this work.

2. All required union and / or flange connections are not necessarily shown on the drawings. The Contractor shall supply and install all fittings and / or flanges required for the maintenance and dismantling of equipment and equipment.

3. Provide access to equipment for maintenance, including bearings that are lubricated for life in accordance with the manufacturer's recommendations or instructions.

4. Connect evacuations of equipment and appliances to a floor drain.

5. Whenever possible, align the edges of the pieces of equipment, as well as those of rectangular cleaning holes and similar items with the walls of the building.

1.4. ENERGY CONSUMPTION

1. The ministry representative may reject the proposed equipment on the basis of performance or energy criteria called or consumed.

2. This clause applies particularly to all mechanical equipment.

1.5. ANCHOR BOLTS AND TEMPLATES

1. Provide the required anchor bolts and gauges, which will be installed under other divisions.

1.6. OBTURATION OF OPENINGS

1. Use suitable components to prevent dust, dirt and other foreign matter from entering the openings of installations and equipment.

2. The Contractor shall locate on the architectural plans the exact location of the fire walls. All holes in a fire wall shall be sealed with ULC approved equipment, equivalent or superior, to the degree of fire resistance of the wall.

1.7. EQUIPMENT SUPPORTS

1. The brackets supplied by the equipment manufacturers are prescribed in Division 23.

2. Supports not supplied by the manufacturers of the pieces of equipment: structural steel. Submit the structural calculations with the shop drawings.

3. The Contractor shall supply and install all additional supporting elements required to connect piping, conduit, equipment or other supports to the structure of the building.

4. Installation bases for the maintenance of the room: bevelled edge, with a thickness of at least 100 mm and overflowing 50 mm around the supported devices.

5. The Contractor shall be responsible for the complete manufacture of all the leveling bases relating to the equipment it supplies and installs.

1.8. CROSSING SLEEVES

1. EMPTY

1.9. TEST

1. Give 48 hours written notice of test date.

2. Do not insulate or conceal works before they have been tested and approved by the Departmental Representative.

3. Conduct testing in the presence of the Departmental Representative.

4. Assume all costs including re-testing and rehabilitation.

5. Piping :

    1. General: Maintain the test pressure without loss for a period of at least 4 hours, unless otherwise specified.

2. Hydrostatically test the piping systems at a pressure equal to 1.5 times the service pressure of the system, or at a pressure of at least 860 kPa: select the higher of these two values.
3. Test the exhaust and ventilation piping in accordance with the requirements of the National Building Code and those of the competent authorities.

6. The equipment shall be tested in accordance with the requirements of the relevant sections of the specification.

7. Before testing, isolate any piece of equipment or other equipment not designed to withstand test pressures.

1.10. PAINTING

1. Comply with Section 09 91 99 - Paintings for minor work.

2. Prime and touch surfaces where the painted finish has been damaged, ensuring that the new finish matches the original finish.

3. Refurbish and thoroughly paint surfaces where the finish has been severely damaged.

1.11. ROSACES

1. EMPTY

1.12. SPARE PARTS

1. Provide all spare parts as recommended by equipment manufacturers.

2. This list is not exhaustive and does not relieve the Contractor from providing any other spare parts deemed essential by the departmental representative.

3. Once the work has been completed and just before the installation is finally received, replace the filter cartridge and filters for the filter batteries.

1.13. SPECIAL TOOLS

1. Provide a kit of all special tools required for the maintenance of the equipment, as recommended by the manufacturers.
    1. Provide commercial-grade grease gun and adapters suitable for all grease and lubrication types used.

1.14. DIELECTRIC CONNECTIONS

1. EMPTY

1.15. OPERATING AND MAINTENANCE SHEETS

1. Provide the operation and maintenance records, which will be incorporated into the Operations and Maintenance Manual by the Contractor.

2. The Operations and Maintenance Manual must be approved by the ministry representative and a final copy must be provided to the ministry representative prior to the final inspection.

3. Operating records must include the following:
    1. Diagrams of the control / environmental control networks and any other control / regulation network (including environmental).
    2. A description of each system / installation and its control / regulation devices.
    3. A description of the operation of each system / installation under various loads, including program of changes of set points and indication of seasonal deviations.
    4. Instructions for operation of each system / installation and component.
    5. A description of the measures to be taken in the event of equipment failure.
    6. A table of valves and flow diagram.
    7. A color code.
    8. A copy of all shop drawings of equipment and systems.

4. Maintenance records should include the following
    1. Instructions for the maintenance, maintenance, operation and correction of defects for each piece of equipment.
    2. List of periodic maintenance work recommended by manufacturers, frequency and tools required.

5. Performance data should include :
    1. The performance cards provided by the manufacturer of the equipment with operating points "as constructed".
    2. The results of the performance tests of the equipment.
    3. The results of special performance tests, as specified in the other sections.
    4. System test, adjustment and balancing reports (ERE) as specified in section 23 05 93.

6. Vérification :
    1. For audit purposes, submit two drafts of the Operations and Maintenance Manual to the departmental representative. Unless required by the Departmental Representative, it will not be permitted to submit the forms individually.
    2. Make the required modifications to the Operations and Maintenance Manual and resubmit it to the Departmental Representative as directed.

7. Additional Data :

    1. Prepare and insert in the manual any information that has been necessary during the training.

1.16. OPERATING AND MAINTENANCE MANUAL

1. Manual :

    1. The manual is a structured compilation of operating and maintenance data including information, data sheets, documents and technical details describing the operation and maintenance of an element or System in each section of the quote.

2. General :

    1. The Operations and Maintenance Manual must be approved by the ministry representative before the final inspection, which will retain the final copies.

    2. Approbation

        - For approval, submit two (2) copies of the draft Operations and Maintenance Manual to the departmental representative. Unless otherwise instructed by the Ministry's representative, the records must not be submitted individually.
        - Make the required modifications to the Operations and Maintenance Manual and resubmit it as directed by the Departmental Representative.

3. Additional information

    - Prepare additional fact sheets and attach them to the Operations and Maintenance Manual if, during the training sessions mentioned above, it is realized that such records are required.

1.17. WORKSHOP DRAWINGS AND TECHNICAL SPECIFICATIONS

1. Workshop drawings and data sheets must be submitted as indicated in Section 01 33 00 Submittal procedures.

1.18. CLEANING

1. Perform appropriate cleaning as described in section 01 74 11 - Cleaning.

1.19. DRAWINGS PROVIDED BY ENTREPRENEUR

1. Documents to be kept on site:

    1. The Professionals will provide a set of reproducible mechanical drawings. Provide the number of sets of prints required for each phase of the work and indicate, as and when, any changes made during the course of the work. Changes to control systems and spinning must follow the same procedure.

2. Every week, have the information on the printouts recorded on the reproducible drawings; Retain the services of a qualified draftsman for this purpose.
3. Use different ink colors for each service.
4. Keep these drawings on site and make them available for reference and verification purposes.

2. Drawings after execution :
   1. Before beginning the tests, balancing and adjustment of the systems, finish the drawings according to execution.
   2. Identify each design in the lower right corner, in letters at least 12 mm high, as follows :

      DRAWINGS: THIS DRAWING HAS BEEN REVISED AND SHOWS THE MECHANICAL SYSTEMS / APPARATUS AS THEY HAVE BEEN INSTALLED

      (Signature of Contractor) (Date).
   3. Submit drawings to Departmental representative for verification and make corrections as necessary.
   4. Carry out the testing, balancing and adjustment of systems, apparatus and networks, taking into account the indications in the drawings.
   5. Provide reproducible copies of completed drawings with operating and maintenance manuals.
3. Submit a copy of the completed drawings for inclusion in the final report (ERE).

1.20. MECHANICAL PLANS AND SPECIFICATIONS

1. Mechanical plans and specifications are complementary. Everything that appears either on the plans or in the quotation is considered included in the plans and specifications of mechanics.

2. The plans shall give an approximate indication of the location of new and / or existing equipment and conduits; Their exact location shall be determined by the Contractor in accordance with the architectural and structural plans, the plans of the existing and the Contractor's statement. In addition, the Contractor must verify on site the space available before installing the appliances and ducts.

3. No architectural or structural data will be taken on mechanical plans.

4. No additional remuneration will be granted for the movement of ducts and apparatus which will be deemed necessary because of structure, architecture or any other normal consideration.

5. During the submission period, the Contractor shall verify the feasibility of the work and take into consideration any existing visible elements that may conflict with the same work. The Contractor shall include in its bid the cost of dismantling and relocating these items.

6. Before submitting a bid, the Contractor shall notify the Departmental Representative of any errors or omissions that may be found in the plans and specifications and any inconsistencies with those of architecture and structure. No supplement will be granted as a result.

7. Details plans that could be provided to the Contractor during the work will also form part of the mechanical plans and specifications. If the Contractor requires detailed plans, he must request it from the Departmental Representative in writing at least fifteen (15) days in advance.

8. The Department's representatives reserve the right to interpret the plans and specifications.

   If there is disagreement between the plans and the mechanical specifications with respect to the quantity, quality, nature or price of certain works or materials, the Contractor shall use in preparing his bid the solution The most costly and must submit its bid accordingly. A credit must be granted to the Owner if another solution is adopted during the construction.

1.21. COMPLETION OF THE WORK

1. Mechanical plans and specifications do not, of course, contain a description or even a description of all the accessories, details, installation methods, etc. required for the complete execution of the work and for the proper functioning of the networks And systems.

2. Although the Contractor is not shown or specifically described in the Mechanical Plans and Specifications, the Contractor shall be required to do all minor work and provide all materials required for proper operation of the systems and systems and for Complete installation and in accordance with the rules of the art, the codes and regulations that govern this work and the recommendations of the equipment manufacturers.

3. Consequently, the Contractor undertakes to accept the decision of the Ministry's representative regarding the supply of materials and the execution of the work required to satisfy the requirements of the mechanical plans and specifications, The codes and regulations governing the present work and the recommendations of the equipment manufacturers.

1.22. EXECUTION

1. How to proceed

   1. The Contractor shall indicate in good time the spaces to be left in the walls, ceilings, roofs, floors and partitions for the installation of the various appliances and conduits.

   2. To this end, the Contractor shall coordinate its work so as to locate in good time all the sleeves and openings it needs. The Contractor shall carry out, at his own expense, all the holes and fillings required for the passage of piping, ducts and ducts, if any.

   3. Every day, it must remove all the waste coming from the execution of the works. Once the work is completed, all tools, debris, surplus material and waste

resulting from the work must be removed from the premises, all installed equipment must be cleaned and damaged; If they are, they must be repaired or replaced.

4. All materials must be stored properly in appropriate places, without interfering with traffic.

2. Work's protection

1. The Contractor shall protect its installation against any damage until the complete work has been accepted by.

2. All the ends of the pipes and pipes laid by the Contractor must be hermetically sealed. When the work benches have been installed inside the building, the Contractor must protect the floor against any deposition or debris that may damage it.

3. Roof racks

1. Where a pipe or conduit passes through the roof, the Contractor shall take all necessary steps to ensure that the expansion and contraction do not detract from the roof.

1.23. HIDDEN WORK

1. No work should be hidden until the departmental representative has accepted it. To this end, the Contractor must notify the Departmental Representative in writing at least three (3) days in advance. If the Contractor fails to comply, he shall pay the costs incurred for the inspection of the works.

1.24. LAYOUT, DIAGRAMS AND VIEWS

1. All layout, diagrams, standard details, plan views and sections shown in the mechanical drawings, as well as the specifications given in the specifications, are complementary. The Contractor shall supply and install all materials, systems and accessories shown either in diagrams, diagrams, standard details, plan views, sections and / or quotes without additional remuneration.

1.25. TESTING

1. After completing the work or part of the works, the Contractor shall, at his own expense and in the presence of the Ministry's representative, carry out tests to prove that his work fulfills all the conditions required. If the Contractor declares any defect whatsoever, the Contractor shall be obliged to remedy it and to re-run other tests, at his own expense, until these tests give satisfactory results.

1.26. GUARANTEE

1. The Contractor shall guarantee his work in accordance with the laws of the place where he is executed. The guarantees mentioned in the quotation and the resulting responsibilities will not be interpreted as limiting the laws of the place or coming against them. These laws take precedence over the requirements of the estimate, unless the requirements of the latter are more considerable than those of the local laws.

2. The Contractor shall, without hesitation, repair or replace, at the discretion of the Departmental Representative, any defect which will occur within one (1) year after the provisional acceptance of the Work, Provided, except for current wear. Damage to other equipment caused by such defect and any expense incurred directly by repairs shall be at the expense of the Contractor.

1.27. FORMATION

1. EMPTY

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 01 74 11 : Cleaning.

.3 Section 03 30 00 : Cast-in-place concrete.

.4 Section 22 05 01 : Common work results for plumbing.

.5 Section 22 07 19 : Thermal networks-Thermal insulation for pipes.

.6 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment

.7 Section 23 05 53 : Mechanical identification.

.8 Section 23 05 93 : Testing, adjusting and balancing for HVAC.

.9 Section 23 07 13 : Thermal insulation for ducting

.10 Section 23 33 01 : Air distribution ducts and accessories.

.11 Section 23 34 01 : Fans.

.12 Section 23 37 13 : Diffusers, registers and grilles.

.13 Section 23 37 20 : Louvres, intakes and vents.

.14 Section 23 41 00 : Particulate air filtration.

.15 Division 26 : Electrical.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB) :
- .1 CGSB1-GP-181M, coatings, zinc rich, organic, ready mixed;
- .2 CGSB 19-GP-M, Sealing compound, one component, silicone base, solvent curing.

.2 Manufacturer's Standardization of the Valve and Fittings Industry (MSS) :
- .1 MSS-SP58, Pipe hangers and supports – Materials, design and manufacture.

.3 Canadian Standards Association (CSA) :
- .1 CSA C22.2, Standard Canadian Electrical Code

.4 American Society of Mecanical Engineer (ASME) :
- .1 ASME B31.1, Power Piping.

.5 National Electrical Manufacturers Association (NEMA).

.6 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE).

.7 Sheet Metal And Air Conditioning Contractors' National Association, inc. (SMACNA).

.8 National Fire Protection Association (NFPA).

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT (FREQUENCY)	REGISTRATION	RESPONSABILITY
1.5.	**MP**	Labor Certificates, see section 1.5.	Before work begins.	Labor Certificates.	Contractor
1.6 1.11	**BP**	Workshop drawings and / or technical descriptions of products and erection drawings	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation.	Letters of transmission. Recording of the shop drawings and / or technical data sheets.	Contractor
1.7	**MP**	Sample	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation.	Letters of transmission. Recording Sample Review.	Contractor
1.8	**BP**	Product testing.	Before the delivery.	Test report.	Contractor
1.9	**MP**	Attestation of conformity.	At the delivery.	Documents of attestation of conformity.	Contractor
1.34	**BP**	Device testing.	Before commissioning.	Test report.	Contractor

BP: BREAKPOINT T **MP** : MONITORING POINT

1.4 CERTIFICATION OF LABOR

.1 Transmit certification of labor attesting to the competence of the contractor for the execution of the ventilation works in accordance with the requirements of the standards and codes in force.

1.5 WORKSHOP DRAWINGS AND TECHNICAL DESCRIPTIONS OF THE PRODUCTS

.1 Submit shop drawings in accordance with Section 01 33 00 " Submittal procedures ".

.2 Indicate also on the shop drawings the conformity to the plans and the specifications of the quality, the mechanical and electrical characteristics.

.3 Workshop drawings and data sheets should show the following :
- .1 Mounting details;
- .2 Clearances necessary to permit operation and maintenance of equipment, eg space required for operation of inspection gates.

.4 Submit the following documents with shop drawings and technical data sheets :
- .1 detail drawings of pedestals, supports and anchor bolts;
- .2 data specifying the sound power of systems and equipment, where applicable;
- .3 performance curves showing operating points;
- .4 a document issued by the manufacturer attesting that the products in question are standard models;
- .5 certificate of compliance with relevant codes.

.5 Submit requests for equivalent products in accordance with Section 01 33 00: " Submittal procedures ".

.6 Submit applications for substituted products in accordance with Section 01 33 00: " Submittal procedures ".

.7 To present with the shop drawings a comparative table for equivalence or substitution of the specified product by equipment type and to adapt it for the relevant characteristics or described in the specifications or drawings of this type of equipment.

.8 The representative of the ministry may return the table if deemed incomplete and this will have to be completed by the contractor in order to allow to continue the verification procedure for this equipment.
- .1 Submit the shop drawing of the proposed product in equivalence or substitution at the same time as the comparative table.

.9 Workshop drawings should clearly state the following (non-limiting list) :
- .1 Appliances, piping and fittings, including fittings, filters, control devices, thermostatic regulators, necessary hardware and auxiliary equipment, fully assembled and equipped with all cables and hoses necessary for the connection The building system; The dimensions and the proposed diversions;
- .2 The final location, during on-site assembly of the piping, valves and fittings shipped separately by the equipment supplier;
- .3 The final location during the on-site assembly of the control equipment shipped separately by the equipment supplier;

.4 The wiring for the whole installation inside and outside the table presented in the form of a diagram and drawings according to the execution;
.5 Dimensions, construction details (interior and exterior), recommended installation method, including proposed structural steel supports, diameter and location of mounting bolt holes and load distribution;
.6 The detailed wiring diagrams of the control networks drawn up by the manufacturer, including wiring and equipment installed in the factory on monobloc units, or required for control devices for auxiliary equipment, accessories and regulators;
.7 The performance curves of the fans;
.8 An evaluation of the noise levels of mufflers, fans and compressor-condenser units, expressed in dB for each octave band, to enable the ministry representative to assess the effectiveness of soundproofing treatments;
.9 Provide installation diagrams, wiring and piping diagrams for the walkway installation, indicating refrigerant flow rates, pipe diameters, pressure drops in appliances and suction lines;
.10 Dimensions, construction details, installation method and recommended mounting type, size and location of the bolt holes and point loads.
.11 Compliance with standards and approvals.

.10 Workshop drawings must be submitted for (non-exhaustive list) :
.1 Compressor-condenser units;
.2 Piping, fittings, valves and fittings for refrigeration;
.3 Certification that an additional 4 year warranty will be provided for refrigeration compressors;
.4 Ventilators and air stations;
.5 Humidifiers;
.6 Direct expansion and electric coils;
.7 Air duct accessories;
.8 Grids, registers and diffusers with color identification and finished clearly described and illustrated;
.9 The terminal elements;
.10 Flexible fittings;
.11 Ribbons and sealants;
.12 The inspection doors;
.13 The deflectors;
.14 Sealing products;
.15 Flexible air ducts including :
.1 Thermal properties;
.2 Friction losses;
.3 Acoustic transmission;
.4 Sealing;
.5 Fire resistance characteristics.
.16 Construction drawings of ventilation ducts and networks;
.17 Filters;
.18 The mufflers;
.19 Supports, shock absorbers and springs;
.20 Roof evacuations;
.21 Fire protection shutters;
.22 Isolation flaps (motorized)
.23 Ductwork or Contractor Fabrication Standards for Ducts, Accessories and Branches.

1.6 SAMPLES

.1 Submit samples in duplicate in accordance with Section 01 33 00 " Submittal procedures " for (non-limiting list):
- .1 Flexible air duct section 300 mm in length, one section of each type used for the project;
- .2 Acoustic insulation and adhesive on a pipe section;
- .3 Fire damper in the sleeve and type of gaskets connecting to ducts (maximum dimension of VCF 300 x 300 mm). The sample will be provided with a handle on top and will be delivered to the location designated by the ministry representative;
- .4 The finish of grids, registers and diffusers;
- .5 Avian fence and expanded metal in its frame (size 300 x 300 mm);
- .6 Air line sealing tape and sealant;
- .7 Balancing register;
- .8 Access door with handle.

1.7 RELIABILITY OF TECHNICAL DATA

.1 Data from manufacturers' catalogs and documentation shall be reliable data, confirmed by tests carried out by the manufacturers themselves or, on their behalf, by independent laboratories, and certifying compliance with the requirements of Codes and standards.

.2 Provide documentation confirming completion of tests.

1.8 ATTESTATION OF CONFORMITY

.1 Provide a written document attesting to the compatibility of the components and, where applicable, that these elements have been authorized for use by a nationally recognized testing organization such as SMACMA, ASHRAE.

1.9 MAINTENANCE SHEETS

.1 Provide in French the necessary instructions for the maintenance of (non-limiting list):
- .1 Provide a brief description of the various HVAC and refrigeration systems; The descriptions shall be clearly identified and inserted at the beginning of the manual and shall give full details of the function, operation, regulation, verification, etc., for each component of the apparatus;
- .2 The installation and, unless otherwise specified, the operation, maintenance and verification of the equipment shall be in accordance with the manufacturer's instructions. Indicate the names and addresses of suppliers of spare parts
- .3 Compressor-condenser units;
- .4 Ventilators and air stations;
- .5 Humidifiers;
- .6 Direct expansion and electric coils;
- .7 The terminal elements;
- .8 Roof evacuations;
- .9 Fire protection shutters;
- .10 Isolation flaps (motorized)

1.10 WORK COORDINATION DRAWINGS (DRAWING DRAWINGS)

.1 General :

.1 Prepare and submit erection drawings to coordinate the work of different construction specialties. Erection drawings will be required at least for the following works:

.1 For all ventilation and air conditioning.

.2 For all mechanical and electrical work in mechanical and electrical rooms, wells, etc.

.3 For all mechanical and electrical work in all areas where space is particularly restricted.

.4 For placement of holes, openings and holes in walls, floors, beams and columns.

.5 For anchorages.

.6 For all venting supports in technical wells.

.7 At locations described in Divisions 23 and 26.

.8 This clause is not exhaustive. Erection drawings may be required at locations deemed necessary by the Ministry representative.

.2 The Ventilation-Air Conditioning Contractor will be responsible for the coordination of his erection drawings with all mechanical and electrical trades. These disciplines must provide all the data, diagrams, drawings and diagrams necessary for this coordination work.

.3 The erection drawings must show clearly and precisely all the work involved, those of the discipline concerned and those carried out by others.

.4 All erection drawings must be prepared with the latest AutoCAD version, presented as a .DWG file, on paper according to the required quantity. The layers of the AutoCAD drawings of each subcontractor must comply with the AICQ standards.

.5 Description :

.1 The erection drawings shall consist of sized planes of scale, indicating the position of appliances, pipes, piping, valves and other fittings with required cuts and details, including the dimensions of piping and ducts, Sheaths, openings, anchors and supports, relative positions with framework, architectural works and other mechanical and electrical works.

.2 Prepare drawings on appropriate scale, but not smaller than 1:20.

.6 Preparation :

.1 Each discipline must make its erection drawings and coordinate with other disciplines.

.2 The Ventilation / Air Conditioning Contractor shall prepare a design of its own work with all necessary data and dimensions and incorporate all information provided by the other trades.

.3 All drawings must be coordinated by the Ventilation-Air Conditioning Contractor with the cooperation of all mechanical and electrical subcontractors.

.4 Erection drawings for a given area must all be submitted at the same time for verification.

.5 At the request of the departmental representative, submit printed erection drawings with different colors to distinguish the work of the different trades

.7 Cooperation :
.1 Close cooperation must exist between the companies responsible for mechanical and electrical works to determine the location of their respective works and to avoid incompatibilities.
.8 Distribution of erection patterns :
.1 Submit to the departmental representative, for verification, two copies approved by the Mechanical Contractor and signed by all stakeholders.
.2 When commented on, the drawings shall be corrected by the section concerned and, if required, resubmitted.
.9 Responsability:
.1 Each subcontractor will be directly responsible for the location and exact dimensions of the openings, perforations and sheaths, the location of its appliances, piping and ducts, whether the structural, architectural or engineering drawings are quoted or not.
.2 The Ventilation-Air Conditioning Contractor shall ensure the perfect coordination of the erection drawings with his / her work.
.3 No compensation will be granted for modifications to the work, for coordination and integration of electromechanical systems.
.4 Although the Ventilation-Air Conditioning Contractor is responsible for the overall coordination of the work, each subcontractor remains responsible for the execution of its work in accordance with the plans and specifications and in accordance with the erection drawings Discipline and coordination with other disciplines. In the event of a breach of this responsibility, the contractor concerned will be required to correct non-compliant work at his own expense.
.5 Verification of the erection drawings by the departmental representative is limited to ensuring that the technical requirements appear to be met (VCF, grids, insulation, etc.). The ministry representative will not verify the quality of coordination Contractors.
.10 Originals of erection patterns :
.1 At the end of the work, CD-ROMs of the AutoCAD drawings and a copy of the drawings as executed must be submitted to the City by each contractor outsourcing mechanical and electrical.
.11 Checking Erection Drawings :
.1 The Contractor shall allocate 10 working days in the planning of his work for the verification of the erection drawings by the representative of the Ministry.

1.11 DRAWINGS ACCORDING TO THE REALITY OF THE WORK EXECUTED

.1 Observe the requirements of section 01 78 00 "Documents / Items to be submitted for completion" and section 23 05 93 "Heating, ventilation and air conditioning - Testing, balancing and commissioning of systems".

1.12 ENERGY CONSUMPTION

.1 Materials subject to the approval of the departmental representative may be rejected based on performance relative to the power demand or energy consumed.

1.13 MATERIALS: PARTICULARITIES AND IMPLEMENTATION

.1 Ensure that maintenance and disassembly can be carried out with the least possible displacement of pipe and duct junction elements through the use of union and flange connections and without the structural elements of the building or any other installation constitute an obstacle.

.2 Provide an easy way to lubricate equipment including lifetime lubricated bearings.

.3 Seat the equipment on a 150 mm high concrete slab with beveled edges that protrude at least 50 mm around the appliances for easy cleaning, all as shown in the drawings.

.4 Connect drain lines to drainage system.
- .1 Humidifier;
- .2 Cooling coil;
- .3 Air intake and evacuation plenum where indicated.
- .4 Any other indication of plans.

.5 Align the edges of the pieces of equipment, as well as rectangular manhole covers and similar items with the walls of the building where possible.

1.14 OBTURATION OF OPENINGS

.1 Prevent dust, dirt and other foreign matter from entering the openings of equipment and appliances.

1.15 ELECTRICAL INSTALLATIONS AND EQUIPMENT

.1 Electrical work shall be carried out in accordance with the requirements of Division 26 and the following paragraphs.
- .1 The responsibility of the supplier and the installer of electrical appliances and installations is described in the table of motors, appliances and controls which appears on the electrical drawings. In addition, the responsibility of the supplier and the installer of mechanical equipment and installations is described in the table of mechanical equipment and installations which appears in the mechanical drawings;
- .2 Refer to Division 26 for wiring and control conduit requirements, except for conduits, wires, cables and connections associated with a network / circuit operating at less than 50 V, which elements Belong to control circuits prescribed in Division 26- "Electricity", Division 22- "Plumbing" and Division 23- "Heating, Ventilation and Air Conditioning";
- .3 The mechanical devices are provided with connection terminals able to receiving either copper or aluminum conductors.

1.16 MOTORS

.1 Supply and install motors for mechanical installations and equipment.

.2 If the prescribed engine delays the delivery or installation of a device, provide and install a provisional engine with the approval of the departmental representative. No equipment will be accepted permanently until the prescribed engine has been installed.

.3 The engines will have the characteristics given to the description of each device. They will be designed for minimal vibration and quiet operation.

.4 The engines will be manufactured in accordance with CSA C22.2 and AMEEC M1-6, for a room temperature of 40 ° C, a duty factor of 1.15 and a T-box according to NEMA.

.5 Unless otherwise stated, the motors will be vented, open "drip-proof". The motors will be equipped with ball or roller bearings, lubricated with grease.

.6 Unless otherwise specified for a special application, motors of 0.25 kW or less will operate at 120 volts, one phase, 60 Hz, 1200 or 1800 rpm. Engines of 0.37 kW or more will operate at 600 volts, 3 phases, 60 Hz, 1200 or 1800 rpm. Engines at 3600 rpm. Will not be accepted.

.7 The engines will be high efficiency according to the NEMA standard.

.8 The manufacturer of a motorized device will be responsible for the choice of the engine. The engine power shown in the drawings and specifications should be considered as a minimum. If the size of an engine should be increased, the contractor will be responsible for the changes caused to all other specialties.

.9 The overheating protection will be of the factory-installed thermistor type, one on each phase, connected to terminals labeled and installed in the junction box of the motor. Provide thermistors for engines of 18.7 kW and more.

1.17 PROTECTIVE GRATINGS

.1 Provide protective gratings for open drives and open bearings or bearings.

.2 The gratings must have the following characteristics :
- .1 expanded metal mesh welded to 25 mm steel angle frame;
- .2 upper and lower galvanized steel sheet 1.2 mm thick;
- .3 removable for maintenance;
- .4 make a 38 mm diameter hole in the shaft axis to insert a tachometer.

.3 Provide and install devices to lubricate these drives and to use test equipment without removing protective gratings.

.4 Install belt guards to allow movement of motors to adjust belt tension.

.5 Protectors for flexible couplings :
- .1 U-shaped, made of galvanized soft steel having a thickness of at least 1.6 mm;
- .2 securely fastened in place;
- .3 removable for maintenance.

.6 Apply a wire mesh or expanded metal mesh, 19 mm mesh, on the suction side or on the discharge side of the ventilated fan blades, so that the actual free area of the protected opening is not less than 80% The original opening.

1.18 SUSPENSION PANELS AND PIPE SUPPORTS

.1 Manufacture the suspension panel, brackets and bracing pieces in accordance with ASME B31.1 and MSS-SP58.

.2 Install the anchor bushings before placing the concrete. Have them in grid network in the machine rooms.

.3 Secure them to the framing elements. If there are no framing elements or if the anchor bushes are not in the right place, hang the brackets to U-shaped profiles or to steel angles. Supply and install additional framing parts. Obtain permission from the departmental representative before using vertical expansion anchors. Use at least two sockets to hold each bracket or bracket. Do not hang them on the metal deck. Fasten piping and equipment according to the manufacturer's recommendations. Have the anchor plan checked.

.1 use adjustable suspension shackles for pipes of all sizes. If necessary, use roller supports;

.2 acceptable products:

.1 Anvil;

.2 Myatt;

.3 Tolco

.4 ou equivalent approved,

.3 Use rigid suspension clamps when the ratio of pipe expansion to collar rod length is not greater than 25: 600 when supporting heating water pipes. The minimum length of the stem shall be 300 mm;

.4 Use of movable suspension collars when the ratio of pipe expansion to the length of the collar rod is not more than 100: 600 when supporting heating water pipes. The minimum length of the stem shall be 300 mm;

.5 use brackets with bracing in the following cases:

.1 where the aforementioned reports can not be obtained;

.2 when the suspension brackets can not be secured to the top of a structural steel frame.

.6 Minimum length of suspension rods shall be 150 mm for all piping, except as indicated above.

.4 Provide and install spring stirrups when it is necessary to compensate for expansion of horizontal pipes connected to long risers.

.5 The spacing between the clustered pipe supports shall be based on the smaller pipe size.

.6 Except in the following cases, refer to the table below for the diameter of the rods and the spacing of the supports.

.1 install a support at every 1.8 m for gas pipes of nominal diameter DN ½;

.2 install brackets every 1.5 m for copper pipes of nominal diameter DN 1/2;

.3 Support plastic piping as recommended by manufacturer

HOSE GRIPPER (NOMINAL DIAMETER)	STEM DIAMETER	MAXIMUM SPACING PIPING	
		FERROUS	COPPER
DN 1-1/4	10 mm	2,1 m	1,8 m
DN 1-1/2	10 mm	2,7 m	2,4 m
DN 2	10 mm	3,0 m	2,7 m
DN 2-1/2 et 3	10 mm	3,6 m	3,0 m
DN 3-1/2	10 mm	3,9 m	3,3 m
DN 4	16 mm	4,2 m	3,6 m

DN 5	16 mm	4,8 m	---
DN 6	22 mm	5,1 m	---
DN 8	22 mm	5,7 m	---
DN 10	22 mm	6,6 m	---
DN 12	22 mm	6,9 m	---

.7 Have the arrangement and type of the supports and wall hooks checked.
- .1 place the support within 300 mm of each horizontal bend;
- .2 all supports shall have at least the following three parts: anchor sleeve, suspension rod, collar or stirrup;
- .3 use mild steel wall hooks to support non-expandable pipes. Leave a clearance of at least 25 mm to allow for thermal insulation;
- .4 Provide and install collars to support risers as indicated.

.8 For non-insulated copper pipes, use copper or copper brackets.

.9 Install insulating harnesses on insulating pipes and prefabricated insulating braces, made of high density insulating material;

.10 The suspension collar and anchors must be offset so that the stem is vertical when the piping is hot.

.11 Adjust the height of the suspension rods according to an even distribution of the load.

.12 For any other type of piping, follow the manufacturer's recommendations.

1.19 SLEEVES AND FRAMES

.1 Locate, supply and install sleeves and frames to concrete or masonry wall or floor crossings. The sleeves and frames of 150mm in diameter and over will be installed in conjunction with the formwork contractor (for concrete elements) and the general contractor (for masonry elements). Sleeves and frames less than 150mm in diameter will be installed entirely by the specialized contractor.

.2 Supply and install sleeves and frames made of galvanized sheet steel.

.3 Use cast iron or steel sleeves with flange attached centrally by continuous welding.
- .1 through foundation walls;
- .2 if the sleeve must extend beyond the finished floor.

.4 Compression sealing sleeves.
- .1 use compression-sealing type sleeves where indicated in the drawings.

.5 Dimensions
- .1 leave an annular clearance of 6.0 mm between the sleeve and the pipes or between the sleeve and the insulation;
- .2 if piping passes under foundation footings, allow an annular clearance of at least 50 mm between the sleeve and the pipe. Backfill to the underside of the sole with concrete of the same strength as the sole.

.6 Lay the frames and sleeves so that they are flush with the concrete and masonry surfaces and protrude 50 mm above the finished floors above the ground. For concrete floors poured directly on the floor, the sleeves will be flush.

.7 Use galvanized cast iron sleeves with caulking groove and clamping flange for piping through roofs. Attach the sleeves to the roof; Caulking between the sleeve groove and the pipe; Securing the roof flashing to the retaining collar; To make waterproof and durable seals.

.8 Fill the voids around the pipes and lines.
- .1 in the case of substructure or underfloor bushings below ground level, caulk with flame retardant and non-hardening mastic between the sleeve and the pipeline protected by the sleeve;
- .2 in the case of wall or floor penetrations, provide space for the installation of a fireproof material. In the case of floors, ceilings or bulkheads rated for fire resistance, do not degrade the fire resistance of the structures through which they are fired;
- .3 ensure that there is no contact between copper pipes or pipes and ferrous metal sleeves;
- .4 fill sleeves for later use with lime plaster or other filler material that is easy to remove;
- .5 apply on exposed exterior surfaces of ferrous metal frames and sleeves a heavy layer of zinc-rich paint conforming to CGSB 1-GP-181M.

.9 Where piping and ducts pass through fire-resistant walls, seal open spaces of approved material and caulk in accordance with CGSB 19-GP-M.

.10 Temporarily seal all holes during work.

1.20 FIREWORK MATERIAL

.1 Supply and installation of fireproof material in annular space between pipes, piping, insulation and adjacent fire separation in accordance with Division 7 "Insulation and Sealing".

.2 Unheated pipes without heat insulation that are not subject to special movement do not require special treatment.

.3 Heat-insulated pipes subject to a certain movement shall be covered with a non-combustible, smooth material that permits a certain movement of the pipe without the risk of damaging the fireproof material.

.4 The insulation and vapor barrier of air pipes and ducts shall not be interrupted or damaged at the crossings of the fire separations.

1.21 ROSETTES

.1 Install rosettes where piping passes through walls, partitions, floors and finished ceilings only in exposed areas for pipes up to and including DN 6.

.2 Use chrome-plated or nickel-plated brass or 302 grade stainless steel roses, one-piece type, with stop screws.

.3 The outside diameter of the rosettes shall be greater than that of the opening or sleeve to be concealed.

.4 The inside diameter of the rosettes shall be perfectly adapted to the outside diameter of the pipes.

1.22 PAINTINGS

.1 Comply with Section 09 91 00 - Paints.

.2 Apply at least one coat of corrosion-resistant primer to ferrous metal supports / suspensions and on-site materials for unheated spaces.

.3 Priming and touching surfaces with damaged paint finishes and ensuring new finish matches original finish.

.4 Refurbish surfaces with excessively damaged finish to require only primer and touch-up.

1.23 REPLACEMENTS PARTS

.1 Provide the following spares in accordance with the requirements of 01 78 00 - Documents / Items to be submitted upon completion of work
- .1 a glass tube for each level indicator;
- .2 a 120 V, 208 V, 230 V and 575 V electric motor for each type / engine capacity for a minimum ratio of 1 spare engine for 25 installed engines
- .3 Provide the following replacement equipment for valves:
  - .1 seats: one seat for 25 taps or valves, for each diameter provided, but at least one in all cases;
  - .2 obturators: one obturator for 25 valves, for each diameter provided, but at least one in all cases;
  - .2 stem packing seals: one seal for 25 valves for each diameter provided, but at least one in all cases;
  - .3 handwheels: two for each faucet diameter supplied.
- .4 replacement cartridges for refrigerant dryers that are renewable;
- .5 oil refill for semi-hermetic compressors;
- .6 portable refrigerant manometers and halogen lamps;
- .7 a cartridge or filter set for each filter or filter bank, in addition to those that will be installed prior to the provisional acceptance of the installation;
- .8 6 fuse links of each type of fire damper.

1.24 SPECIAL TOOLS

.1 Provide a kit of all special tools required for the maintenance of the equipment, as recommended by the manufacturers and in accordance with Section 01 78 00 - Documents / Items to be submitted upon completion of work.

1.25 DOORS OF VISIT

.1 Unless otherwise indicated, locate inspection doors in ceilings or partitions to allow for the maintenance of equipment and accessories, or for inspection of safety and Order. Access doors must be installed in accordance with the requirements of the section on the construction of walls or ceilings.

.2 Unless otherwise indicated, inspection doors shall be flush mounted and 600 x 600 mm in the case of an entrance hole and 300 x 300 mm in the case of a handhole. They must open at 180 degrees and have rounded corners; They shall be fitted with concealed hinges, screwdriver bolts and anchor fittings. The steel must be primed and the doors must be from a recognized manufacturer.

.3 In the case of tile surfaces, access doors shall be made of stainless steel.

1.26 DIELECTRIC CONNECTIONS

.1 Provide dielectric fittings for joining pipes made of different metals.
- .1 provide dielectric joints for pipes with nominal diameters DN not exceeding 2 and flanges for pipes with nominal diameters DN greater than 2;

.2 Upon approval of ministry representative, cast brass fittings may be used.

.3 Provide and install felt or rubber linings to prevent contact between elements made of different metals.

1.27 CLEANING

.1 Clean building equipment and mechanical appliances in accordance with Section 01 74 11 - Cleaning.

.2 Clean interior and exterior of all components, including strainers and filters.

.3 Immediately prior to the provisional acceptance of the facilities, clean and refurbish all appliances and leave them in perfect working order; Replace all filters and strainers.

1.28 SPECIAL CONDITIONS

.1 The Contractor shall be responsible for taking all measures, ordinary and extraordinary, to protect all networks of ducts and air-handling equipment against dust and all substances liable to soil Inside and outside the ducts and accessories.

.2 If, at the discretion of the Departmental Representative, the Contractor fails to take adequate protective measures and / or portions of existing air handling ducts and equipment become contaminated with construction wastes Sandblasting dust or organic or inorganic debris, the contractor shall vacuum clean these portions of ducting at his own expense.

1.29 TESTS

.1 Test air distribution systems prior to commissioning of equipment.

1.30 MANAGEMENT AND DISPOSAL OF RESIDUAL MATERIAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : "Submittal procedure".

.2 Section 03 30 00 - Cast-in-Place Concrete.

.3 Section 22 05 01 : "Plumbing – General prescription".

.4 Section 23 05 01 : "Use of HVAC systems during construction".

1.2 REFERENCES

.1 National Building Code of Canada (2010).
.2 National Fire Protection Association (NFPA)
  .1 .1 NFPA 13-last edition, Standard for the Installation of Sprinkler Systems.
.3 CSA : Canadian Standards Association :
  .1 CAN/CSA S832-F06 (C2011) Seismic Risk Reduction of Operational and Functional Components (OFCs) of Buildings.

.4 ASHRAE : American Society of Heating, Refrigerating and Air-Conditioning Engineers, inc.

.5 SMACNA : Sheet Metal and Air Conditioning Contractors' National Association.

.6 OIQ : Ordre des ingénieurs du Québec.

1.3 SERVICES OF AN ENGINEER

.1 Retain the services of an engineer, member of the Ordre des ingénieurs du Québec, specialized and recognized in the field of seismic protection of mechanical installations. He must have a good knowledge of the ASHRAE and SMACNA standards as well as the requirements of Part 4 of the CNB relating to the calculation of earthquake-proof supports.

.2 At the request of the departmental representative, provide the curriculum vitae of the selected engineer.

.3 Mandate for :
  .1 Complete design of seismic systems and devices required for all piping, air ducts and HVAC systems;
  .2 Produce engineering report including: data, calculations and design criteria;
  .3 Produce shop drawings and provide all data sheets and other design elements;
  .4 To produce, sign and seal a certificate of conformity upon completion of concealed work and at the end of all work.

1.4 DESIGN CRITERIA

.1 Comply with NBC requirements for earthquake resistant and Emergency Preparedness.
.2
.3 The engineering report should contain the following information :
  .1 Project title and project number;

.2 Project design criteria including:
- .1 Location of project;
- .2 The value of Sa (0.2), as given in the NBC;
- .3 Category of project location based on seismic response of site;
- .4 The value of Fa;
- .5 The IE risk coefficient for seismic loads and effects, this factor for power stations and substations is in Category IE = 1.5;
- .6 The height of the building above the ground;
- .7 List of all project equipment distributed between :
  1. Those that are calculated in accordance with the NBC rules in the report;
  2. Those which are not the subject of a calculation, with justification.

.3 Calculation of seismic loads created by seismic stresses of all equipment to be computed showing:
- .1 Identification of equipment;
- .2 Its location, including height hx;
- .3 Operating weight;
- .4 its class and its CP, AR and PR coefficients;
- .5 Design side load calculated VP;
- .6 Loads on building structure.

.4 Roll over calculation of equipment on a ground, slab or roof base showing:
- .1 Its dimensions, including length L, width or depth P, height H and center of gravity hcg;
- .2 The moments of overturning Mr and opposition to the overturning Mo .

.5 Means to counter calculated seismic stresses, including:
- .1 Resistance to seismic stress;
- .2 A sketch showing the installation of seismic devices designed to attenuate the seismic load;
- .3 Plans showing the location and type of longitudinal, transverse or 4-channel seismic devices;
- .4 Specification of acceptable products and parts to be used for seismic protection, including anchors, bolts and nuts, aircraft cables and equipment.

.6 Verification that springs and other attenuators are earthquake resistant and that anti-vibration rails and roof rails have been provided with a letter from an engineer attesting that they are able to withstand without fail seismic loads That the equipment they support would impose them;

.7 The signature of the engineer who produced the engineering report and his OIQ member number.

1.5 INSPECTION OF WORKS

.1 On completion of the work and before the provisional acceptance can be issued, the contractor shall forward to the departmental representative a verification report of the installed seismic protection system certifying that it meets the requirements of the report d 'engineering. This compliance report must be signed by the same engineer who completed the engineering report.

.2 Verification report to include:
- .1 A copy of the engineering report;
- .2 Verification of earthquake resistant equipment for which the engineering report required protection;

.3 A finding that the seismic system meets the requirements of the Engineering Report and the Reference Codes and Standards.

1.6 MANAGEMENT AND DISPOSAL OF RESIDUAL MATERIAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2. PRODUCTS

2.1 ELASTOMERIC PADS

.1 Type EP1 - neoprene waffle or ribbed; 9 mm minimum thick; 50 durometer; maximum loading 350 kPa.

.2 Type EP2 - rubber waffle or ribbed; 9 mm minimum thick; 30durometer natural rubber; maximum loading 415 kPa.

.3 Type EP3 - neoprene-steel-neoprene; 9 mm minimum thick neoprene bonded to 1.71 mm steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa.

.4 Type EP4 - rubber-steel-rubber; 9 mm minimum thick rubber bonded to 1.71 mm steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa.

2.2 ELASTOMERIC MOUNTS

.1 Antivibration pad type M1: double deflection type, with oil-resistant rubber molded insulation, waterproof compressed glass fiber or neoprene, with a factory-drilled top plate for equipment bolting and d A base plate for bolting to the structure. Color code or other means of identification indicating the range of capacities.

.2 Seismic blocks, type M2: anti-vibration supports with multidirectional earthquake restraints.

2.3 RESSORTS AMORTISSEURS

.1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.

.2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.

.3 Cadmium plate.

.4 Colour code springsr.

2.4 PLOTS À RESSORT(S)

.1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.

.2 Type M2 - stable open spring: support on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad.

.3 Type M3 - stable open spring: 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.

.4 Type M4 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.

.5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg maximum.

2.5 SUSPENSIONS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30 degrees arc without metal to metal contact.

.2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.

.3 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.

.4 Type H3 - stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.

.5 Type H4 - stable spring, elastomeric element with precompression washer and nut with deflection indicator.

2.6 ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES

.1 Acoustic barriers: between pipe and support, consisting of 25 mm minimum thick heavy duty duck and neoprene isolation material

2.7 HORIZONTAL THRUST RESTRAINT

.1 Spring and elastomeric element housed in box frame; assembly complete with rods and angle brackets for equipment and ductwork attachment; provision for adjustment to limit maximum start and stop movement to 9mm.

.2 Arrange restraints symmetrically on either side of unit and attach at centerline of thrust.

2.8 STRUCTURAL BASES

.1 Type B1 - Prefabricated steel base: integrally welded on sizes up to 2400 mm on smallest dimension, split for field welding on sizes over 2400 mm on smallest dimension and reinforced for alignment of drive and driven equipment; without supplementary hold down devices; complete with isolation element attached to base brackets arranged to minimize height; pre-drilled holes to receive equipment anchor bolts; and complete with adjustable built-in motor slide rail where indicated.

.2 Type B2 - Steel rail base: structural steel, positioned for alignment of drive and driven equipment; without supplementary hold down devices; complete with isolation element attached to base brackets arranged to minimize height; and pre-drilled holes to receive equipment anchor bolts.

.3 Bases to clear housekeeping pads by 25 mm minimum..

2.9 INERTIA BASE

.1 Type B3 - Full depth perimeter structural or formed channels, frames: welded in place reinforcing rods running in both directions; spring mounted, carried by gussetted height-saving brackets welded to frame; and clear housekeeping pads by 50 mm minimum.

.2 Pump bases: "T" shaped, where applicable, to provide support for elbows.

.3 Concrete: to Section 03 30 00 - Cast-in-Place Concrete.

2.10 ROOF CURB ISOLATION RAILS

.1 General: complete factory assembled without need for sub-base.

.2 Lower member: continuous rectangular steel tube or extruded aluminum channel.

.3 Upper member: continuous rectangular steel tube or extruded aluminum channel to provide continuous support for equipment, complete with all-directional neoprene snubber bushings 6 mm thick to resist wind and seismic forces..

.4 Springs: steel, adjustable, removable, selected for 25 mm maximum static deflection plus 50% additional travel to solid, cadmium plated, sized and positioned to ensure uniform deflection.

.5 High frequency isolation: 6 mm minimum thick continuous gasket on top and bottom of complete assembly or pads on top and bottom of each spring. Material: closed cell neoprene

.6 Weatherproofing: continuous flexible counterflashing to curb and providing access to springs. Material: aluminum, neoprene.

.7 Hardware: cadmium plated or galvanized.

2.11 PARASISMIC PROTECTIVE SYSTEM EQUIPMENT AND MATERIAL

.1 The design engineer of the earthquake protection system must provide sufficient information in its engineering report to enable the contractor to provide the equipment necessary for the seismic protection of the project.

.2 Cartridge fasteners and anchors that are simply removed must not be used to withstand traction loads.

.3 Rock fasteners must be approximately 60 cm in length (sound rock) and approved for rock type in place, if rock type is not available, a low type rock shall be used for selection Anchors.

.4 Friction supports are prohibited for seismic devices, with or without restraint. For supports without seismic relief devices, they must include a retention mechanism such as a retaining strap.

.5 Roof bases and frames shall be properly anchored to the structure of the building so as to be able to withstand the horizontal seismic and rollover loads imposed by the equipment they support.

.6 Any anti-vibration spring or rail must be earthquake resistant, ie it must be manufactured with a blockage preventing its overflow during an earthquake. A retaining cable is not an acceptable means of retaining the parts of an antivibration rail against seismic loads. The manufacturer must provide a document signed by an engineer attesting the permissible seismic load of the spring or anti-vibration rail.

.7 Aviation cables used as seismic protection equipment shall be of 7x7 or 7x19 composition, ie 7 strands of 19 wires. They shall be galvanized, with remote identification means, of diameter, or covered with a corrosion protection membrane coded in color to establish the diameter at a distance :

.1 The following colors will be used to identify the diameter of the cables:

.1 Blue: 1/16 "Ø cable, with minimum breaking load of 2135 N and permissible load of 1070 N;

.2 Yellow: 3/32 "Ø cable with minimum breaking load of 4450 N and allowable load of 2220 N;

.3 Green: 1/8 "Ø cable with minimum breaking load of 7560 N and allowable load of 3780 N.

.2 Any seismic load requiring a cable larger than 1/8 "Ø shall be submitted for acceptance to the Departmental Representative;

.3 At both ends, they shall be fitted with at least two oval clamping rings or clamping lugs installed at least 25 mm apart. Loop ends should be made with a cable eye. They must be installed slightly relaxed, ie with a slack of not more than 50 mm under pressure of the thumb. When applicable, they should be installed to allow thermal expansion and contraction of the piping. The permissible load shall be at least twice the minimum breaking load of the cable.

.8 Grilles and diffusers shall be secured to the structure of the building by means of two 1/16 "Ø aviation cables or a 16 gauge galvanized pin at the two diagonally opposite corners of the aircraft.

.9 Variable volume boxes and suspended mufflers shall be retained on the bracket bracket by means of metal screws, which shall not, however, replace the required seismic protection devices.

PART 3. EXECUTION

3.1 INSPECTION

.1 Before work begins :

.1 Inspect areas and equipment for vibration isolators and earthquake resistors to ensure compliance with installation tolerances and other conditions that may affect the behavior of insulators and devices;

.2 Inspect primary installation of on-site cast reinforcements and anchors to verify actual locations prior to installation;

.3 Install only when unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

.1 Multiple Pipe Supports: Attach pipes to trapezoidal frames using factory-manufactured clamps designed for application.

.2 Suspension strut stiffeners: install suspension strut stiffeners when necessary to prevent buckling of suspension rods under seismic forces.

.3 Resistance of earthquake-resistant supports and restraints: Where there is no indication, select sizes of components so that their strength is sufficient to withstand current and future static and seismic loads within specified load limits.

3.3 INSTALLATION OF ANTIVIBRATORY DEVICES AND PARASISMIC RETENTION DEVICES

.1 Equipment retainers :
- .1 Install anti-seismic shock absorbers on plumbing fixtures mounted on vibration isolators. Install the dampers as close as possible to the vibration isolators and bolt them to the base of the equipment and the structure supporting it;
- .2 Install resilient insulation washers on equipment anchor bolts in case the gap between the anchor and the adjacent surface is greater than 3.225 "(0.125");
- .3 Install anti-seismic restraint systems using methods recognized and recommended by the manufacturer.

.2 Pipe retainers :
- .1 Complies with MSS SP-127 specifications and SMACNA recommendations;
- .2 Space the side supports at a maximum center distance of 6.1 m (20 feet), and the longitudinal supports at a maximum center distance of 12.2 m (40 feet). The spacing may be reduced depending on the weights and dimensions of the piping; Follow SMACNA guidelines.
- .3 Do not braze pipes where the distance between the top of the element and the attachment to the structure is less than 150 mm (6 inches);
- .4 Counterbore all pipes with a diameter of DN2-1 / 2 and more except for DN1-1 / 4 pipes and above in mechanical rooms. For trapezoidal ducts or pipes, if the total weight of the assembly exceeds the weight of a DN2-1 / 2 or DN1-1 / 4 duct in mechanical rooms, they shall be braced;
- .5 Provide a bracing bracket for any change of direction greater than 3.7 m (12 feet);
- .6 Secure each pipe, regardless of size, whenever it passes through a floor, slab or roof;
- .7 Suspended or deposited equipment less than 10 kg do not have to be secured.

.3 Seismic protection devices shall be designed so as to prevent any permanent displacement or deformation caused by seismic loads and to prevent damage caused by a movement created by an earthquake.

.4 The design of the earthquake protection system shall take into account the design of the electromechanical system and its environment so as not to impair its functionality or interfere with equipment or architectural elements in the vicinity.

.5 Seismic protection devices shall not contain any brittle components.

.6 Cleanliness bases shall be properly anchored to the concrete slab to prevent them from moving or tipping with the equipment contained therein. The dimensions of the docking bases must take account of the recommendations of the manufacturer of the anchorages concerning the space required up to the edge of the base.

.7 Roof bases shall be properly anchored to the structure of the building to avoid the use of stays or other seismic protection devices that penetrate the roof membrane.

.8 No earthquake protection device shall be attached or retained by the bottom of a beam to prevent the risk of buckling failure.

.9 The compression load on the suspension rods shall be calculated to ensure that they are not susceptible to buckling failure.

.10 When a load is on insulators or springs that are not earthquake resistant, the calculated seismic load shall be increased by a factor of 2.

.11 When the center of gravity of an equipment does not correspond to its center of stiffness, the seismic load calculation shall take this into account.

.12 Where the anchor bolts of an equipment are placed in holes larger than 2 mm in diameter of the anchor bolt, the hole shall be filled with a metallic mastic designed for that purpose.

.13 The tensile load on the suspension rods in the vicinity of a rigid bracing must be calculated to ensure that it does not exceed the allowable load on the rod or anchor.

.14 In addition to the required seismic protection on lengths, pipes with mechanical seals such as cast iron piping shall be retained at least at all changes of direction.

.15 Rigid braces will not be used for pipes with a risk of contraction / thermal expansion such as steam piping.

.16 The angle of the bracing cables shall not exceed 45 ° from the horizontal plane.

.17 Tanks, expansion tanks and water heaters shall be anchored at their base or slab and secured to the structure of the building with a collar installed between 2/3 and 3/4 of their height. A collar must be installed between ¼ and 1/3 of the height when it is not possible to have an anchorage at the base.

.18 It is prohibited to use flexible and rigid braces on the same pipeline.

.19 Anchorages shall have a length to diameter ratio of at least 8: 1.

.20 Install cables so that they do not touch the edges of adjacent equipment or building structure.

.21 Installing earthquake restraints using methods approved by SMACNA and ASHRAE.

.22 .22 Install anchor bolts for floor mounted equipment so that resilient material can be installed between the anchor bolt and the mounting hole in the concrete base.

.23 For all types of docking anchors, make sure that the anchor is positioned far enough from the rim as recommended by the manufacturer to prevent the base from bursting.

.24 Install wall mount fixing bolt bushings so that resilient material can be installed where equipment or mounting profiles are attached to the wall.

.25 Fastening to the structure: if a specific type of fastening is not indicated, attach the bracing to the structure to the beam flanges, top frames of girder trusses, or concrete elements.

.26 Pre-piercing anchors :

- .1 Locate the position of the reinforcing steel or any recessed element before drilling the anchor holes. Do not damage reinforcing steel or recessed components during core drilling or drilling. Inform the ministry representative if reinforcing steel or other embedded elements are encountered during drilling. Locate and avoid prestressing frames, electrical and telecommunications conduits, as well as gas lines;
- .2 Do not drill holes in concrete or masonry until concrete, mortar or grout has reached full design strength;
- .3 Expansion Anchors: Protect the thread from damage when installing the anchor. Install the reinforced shell anchors by fully engaging the shell in the structural member to which the anchor is to be attached;
- .4 Adhesive anchors: clean holes to remove inconsistent materials and drilling dust before placing adhesive. Put the adhesive in the holes starting at the bottom and gradually rising towards the surface so as to prevent the formation of air pockets in the adhesive;
- .5 Tighten anchorages to torque recommended by manufacturer using torque wrench;
- .6 Installing galvanized anchors in interior and stainless steel anchors for exterior applications.

3.4 ABSORPTION OF DIFFERENTIAL SEISMIC DISPLACEMENTS

.1 Refer to structural drawings and check on site to locate seismic seals in building.

.2 Install flexible connections in piping where they pass through seismic joints where adjacent sections or branches are supported by different structural elements and where the last connection is on equipment anchored to an element of Structure different from that supporting the connections upstream of this equipment. Comply with the requirements of the Division 22 Drinking Water Piping Section for Flexible Piping Connections.

3.5 SETTINGS

.1 Adjust insulators after plumbing installation has reached operating weight.

.2 Adjust end stops on retaining spring isolators to install equipment at normal working height. After complete installation of the equipment, adjust the end stops so that they do not come into contact during normal operation.

.3 Adjust the active operating height of the spring isolators.

.4 Adjusting restraint systems so that equipment can move freely during normal operation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 section 01 33 00 : Submittal procedures.

.2 Section 22 07 19 : Thermal networks - Thermal insulation for pipes

.3 Section 23 05 01 : Common work results for HVAC.

.4 Section 23 05 48 : Vibration and seismic controls for hvac piping and equipment.

.5 Section 23 07 13 : Duct insulation

1.2 REFERENCES

.1 Execution of Work: as per CGSB 24-GP-3a, unless otherwise indicated.

.2 CSA and / or ULC certification plates: as required by these organizations..

.3 Laboratoires des assureurs du Canada (ULC).

.4 Canadian General Standards Board (CGSB) :
- .1 CGSB 24-GP-3a, Identification et classification des systèmes de conduits;
- .2 CGSB 1-GP-12C, Standard paint colors.remplacé par : (Federal Standard 595B).

.5 Canadian Standard Association (CSA) :
- .1 CSA B149.2, Propane storage and handling code;
- .2 CAN/CSA Z321, Signs and symbols for workplace.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	PB/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
1.4	**PB**	Technical product descriptions.	Prior to delivery, as per requirements for submission of shop drawings or bidding execution.	Letter of transmission. Recording of technical descriptions.	Contractor
1.5	**MP**	Texts of nameplates and list of device numbers.	Before burning the texts on the rating plates.	Letter of transmission. Registration of the	Contractor

PB : BREAKPOINT **MP**: MONITORING POINT

1.4 TECHNICAL DESCRIPTION OF PRODUCTS

.1 Submit technical product descriptions in accordance with Section 01 33 00 - Submittal procedures.

1.5 TEXT AND LIST OF MACHINE NUMBERS

.1 Submit the texts and list of installed equipment numbers.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCT

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

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

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:
- .1 Equipment: manufacturer's name, model, size, serial number, capacity.
- .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATE

.1 Supply and install self-adhesive lamicoid plastic plates 90 x 40 x 3 mm nominal thickness, with black lettering engraved on a 6 mm white background.

.2 Secure the plates securely in conspicuous places. On appliances with a non-insulated flat surface, the plates must be screwed to the appliance.

.3 Burn the number of the appliance, its function, the serviced area and the starter, inverter or CCM which controls it;

.4 Inscription must be in French and in English.

.5 Submit the text tag list to the departmental representative before engraving the message.

2.3 PIPING

.1 Identification :
- .1 Identify piping using basic colors, arrows, pictograms and inscriptions.

.2 Basic colors:

.1 Comply with the conventional color chart of CGSB 1-GP-12C and CSA B149.2 as follows:

CLASSIFICATION OF MATERIALS	BASIC COLORS	PICTOGRAMS COLORS	LEGEND AND ARROWS
Hazardous Material	Yellow 505-101	Red 509-102	Black 512-101
Harmless Materials	Green 503-107	White 513-101	White 513-101
Protective Materials	Blue 202-101		

.2 Apply the base color to the pipe of outside diameter, including insulation, greater than or equal to DN 11/2 by means of:

.1 Adhesive tape with appropriate colored boom 50 mm wide, spirally wound on the pipe or its casing. At each end, add one turn of ribbon plus an overlap of one-third (1/3) the diameter of the pipe. Apply self-adhesive label of the same color;

.3 The length of the tape will be 700 mm for pipes with a diameter less than DN 6 and 1 m for those with a diameter greater than or equal to DN 6.

.3 Inscription :

.1 If the base color has been painted, apply the characters on the base color using stencils or prints. If ribbons and tags have been used, add the inscription on the label by means of self-adhesive letters and arrows;

.2 Identify the flow direction of the fluid in the pipe by an arrow downstream of the marking. In the case of a reversible flow, place the inscription between two arrows of opposite direction;

.3 The color of the lettering and arrows will be white when the base color is green or red, and black if the base color is blue or yellow. The characters will be in "universe" style;

.4 The characters size shall correspond to the diameter of the pipe as follows :

NOMINAL EXTERNAL DIAMETER	HEIGHT OF LETTERS	WIDTH OF LINE (MINIMUM)	LENGTH OF ARROWS	WIDTH OF ARROWS
11/2 à 21/2	20 mm	6 mm	100 mm	20 mm
3 à 5	50 mm	8 mm	150 mm	50 mm
6 et +	90 mm	8 mm	150 mm	50 mm

.4 Pictograms :

.1 Provide and apply the pictograms to the right of the legend, one after the other if there are several, on the base color;

.2 Print self-adhesive pictograms on Brady B-350 or B-500 vinyl material depending on the application, with the approval of the departmental representative;

.3 The size of the pictograms shall correspond to the diameter of the pipe as follows :

EXTERNAL DIAMETER	PICTOGRAM SIZE	WHITE BORDER
11/2 à 21/2	Equilateral: 60 mm side	3 mm
3 à 5	Equilateral: 75 mm side	3 3/4 mm
6 et +	Equilateral: 100 mm side	5 mm

.4 The graphic symbols conform to the CAN / CSA Z321 standard.
.5 All graphic symbols will be white on a red background with a white border around the perimeter;
.6 On the temperature or pressure pictograms, the black lettering will be glued or inscribed with a marker pencil on the white rectangles.

.5 Identification of the smallest pipe size :
.1 Fix a metal plate 75 mm wide, 700 mm long and 1.5 mm thick on the pipe by means of "U" anchors, galvanized or painted, at each end on piping with diameter less than DN 1 ½ (including insulation);
.2 On uninsulated pipes, add 13 mm of unicellular elastomer between the pipe and the plate along its entire length as well as between the anchors and the pipe;
.3 Paint the plate of the appropriate base color;
.4 Glue the 60 mm side pictogram to the right end of the plate;
.5 Paint or glue the lettering and arrows on the plate. Use characters 20 mm high and arrows 100 mm long and 20 mm wide;
.6 Preformed rigid sleeve of mechanical type with attachement, color and conforming lettering wrapping around the piping.

.6 Table 1: Piping identification and identification of pictograms.

CIRCULATED MATERIAL	BASIC COLOR	PICTOGRAM	INSCRIPTION
Controls / wiring	Green	None	Building Controls
Refrigeration / Liquid	Green	None	Liquid
Refrigeration / Aspiration	Green	None	Aspiration

.7 Location of Identifications :
.1 Identify the piping at the following locations :
.1 on both sides of wall, floor and ceiling crossed;
.2 at each valve except those for draining grids, convectors and plumbing fixtures;
.3 to access doors;
.4 to each branch;
.5 The maximum distance between the indicators will be 8 meters;
.6 To any other place specified by the departmental representative or to drawings.
.2 when several parallel horizontal pipes pass in the same area, place the identifications in the same vertical plane;
.3 when several parallel vertical pipes pass in the same area, place the identifications in the same horizontal plane, approximately 2 m above the floor;

.4 On a vertical pipe, the inscription must be written from bottom to top.

2.4 VALVE, CONTROLLERS

.1 Identification of valves :
- .1 Identify all valves using brass tags at least 30 mm in diameter and 1.5 mm thick fastened to the taps using metal chains and numbered 12 mm in height embossed;
- .2 Draw up a list approved by the Departmental representative of valves with their number, system, location, use and normal position.
- .3 Place a laminated copy of the list in the operation and maintenance manuals;
- .4 Mount flow diagrams indicating valve number and positioning (normally open, normally closed) in a glass frame placed under the annunciator near the control panel in the mechanical room;
- .5 Number the valves consecutively in order to facilitate their use;
- .6 Provide diagrams for :
  - .1 (vide).

.2 Locating hidden valves in the inter-ceiling :
- .1 The valves concealed in an interspace must be located by a brass plate 40 mm in diameter and 1.5 mm thick fixed to the ceiling support under the valve or the group of valves using two screws retained by nuts.

2.5 IDENTIFICATION DUCTWORK SYSTEMS

.1 Identify all ducts with 100 mm high stencilled black letters and 15 mm wide line. The arrows will be 150 mm long and 50 mm wide.

.2 The inscriptions to be fixed to the ducts shall be as follows :

CIRCULATED PRODUCT	INSCRIPTION
Supplying air	SYST. UC(x)A*
Returning air	SYST. UC(x)R*
Fresh air	AIR FRAIS UC(x)A*
Exhaust air	AIR VICIÉ UC(x)R*
Exhaust air	SYST. VE(x)*
*Exemple :	
System return UC1	UC1R
Sypply system UC1	UC1A
Evacuation system VE1	VE1

PART 3 - EXECUTION

3.1 NAMEPLATES

.1 Place the plates so that they can be read easily. They must not be painted or covered with heat insulation.

3.2 EQUIPMENT AND NETWORK NAMEPLATES

.1 Location.

.1 Plates shall clearly identify appliances and piping systems in an appropriate manner and shall be placed where they will be visible to facilitate reading from the floor.

3.3 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

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

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

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

.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

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

.8 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.

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

.10 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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 01 78 00 : Closeout submittals.

.3 Section 23 05 01 : Common work results for HVAC.

.4 Section 23 05 48 : Vibration and seismic controls for hvac piping and equipment.

.5 Section 23 05 53 : Mechanical Identification.

.6 Section 23 33 01 : Air distribution ducts and accessories.

.7 Section 23 34 01 : HVAC Fans.

.8 Section 23 37 13 : Diffusers, registers and grilles.

.9 Section 23 37 20 : Louvres, intakes and vents.

.10 Section 23 41 00 : Particulate air filtration.

.11 Division 26 : Electricity.

1.2 REFERENCES

.1 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) :
  .1 ASHRAE 111, Practices for measurement, testing, adjusting and balancing of building heating, ventilation, air conditionning and refrigeration systems.

.2 Sheet Metal And Air Conditioning Contractors' National Association, inc. (SMACNA) :
  .1 HVAC Air Duct Leakage Test Manual.
  .2 HVAC Systems - Testing, Adjusting and Balancing.

.3 Associated Air Balance Council(AABC).
  .1 National Standards for Total System Balance.

.4 National Environmental Balancing Bureau(NEBB).
  .1 Testing, Adjusting, Balancing of Environmental Systems.

.5 Canadian Standard Association (CSA) :
  .1 CAN/CSA B149.2-M, Propane storage and handling code.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE					
ART.	**BP/MP**	**PRESCRIPTIONS**	**MOMENT**	**RECORDS**	**RESPONSABILITY**
1.10 1.11	**MP**	Workforce certification for system balancing.	Before the work begins.	Certificates of the workforce.	Contractor
1.16	**BP**	Technical product descriptions.	Before the work begins.	Letter of transmission. Recording of technical descriptions.	Contractor
1.9	**BP**	Analysis of the performance of installed	Before commissioning.	Forms of attestation of performance.	Contractor
1.5	**MP**	Notice to departmental representative for test schedules and operating demonstrations.	Before testing	Calenders	Contractor
1.4 1.8 1.10 1.11	**BP**	Essais, réglages et équilibrage des systèmes.	Before commissioning.	Test reports	Contractor

BP : BREAKPOINT **MP** : MONITORING POINT

1.4 GENERAL REQUIREMENTS

.1 Give written notice of 72 hours prior to scheduled testing, including the names of all persons who will be present during the trials for approval by the departmental representative.

.2 Do not insulate or conceal the structure before it is tested and approved. Follow schedule and make arrangements for trial.

.3 Observe the recommended start-up procedures recommended by the manufacturer, unless otherwise stated.

.4 Special testing and commissioning operations may be prescribed in another section.

.5 Carry out the tests in the presence of the Departmental representative.

.6 Before testing, disconnect all equipment or other equipment that is not designed to withstand test pressures.

.7 The contractor is required to produce a test report for each test to be performed. Use the report templates attached to this section, or the manufacturer's forms. The departmental representative reserves the right to refuse any incomplete report. Record all pertinent installation and operation notes including the date of testing and the dates for the correction of deficiencies.

.8 Provide the labor, materials and equipment required for the proper conduct of the tests in accordance with the prescribed codes and requirements. The departmental representative reserves the right to further certain tests or to require additional tests for any part of the work whose conformity with the contractual documents seems doubtful. Assume the cost of additional testing and inspections.

.9 Each test report must be signed by the person who recorded the data and the site manager of the contractor and the departmental representative.

.10 Identify in the report all instruments used during testing and adjustment as well as the date of the last calibration of each.

.11 Provide two (2) copies of the test and inspection reports for approval without delay to the departmental representative. Include in the Operations and Maintenance Manual approved test reports as prescribed.

1.5 SCHEDULE REQUIRED

.1 Submit a schedule of tests and demonstrations of operation indicating the expected dates and the representatives of the competent authorities required to attend the test.

.2 Submit a schedule of training sessions.

.3 Revise calendars monthly to adopt them during the project.

1.6 TESTING

.1 Use facilities and equipment for testing prior to acceptance.

.2 The following facilities and equipment will be tested (non-exhaustive list):
- .1 Air handling units;
- .2 humidifiers;
- .3 Aeraulic networks (including terminal equipment / accessories);
- .4 Ventilation and evacuation devices;
- .5 cooling systems;
- .6 Regulators and instrumentation;

1.7 PROCEDURE

.1 Test, adjust and balance systems. Write and deliver test report. Correct defective parts that do not comply with the specifications. Write and deliver the final test report with annotations and correction dates for each deficiency.

.2 Only carry out testing, adjustment and balancing operations when the building is largely usable where :
- .1 The installation of ceilings, doors, windows and other building elements affecting these operations has been completed:
- .2 The laying of sealing and caulking products, as well as weatherstripping is complete;

.3 The installation and start-up of the mechanical, electrical and associated control systems affecting these operations have been completed, including, but not limited to the following:
- .1 Thermal overload protection connected in the circuit of the electrical equipment;
- .2 aeraulic networks :
  1. clean and in place filters;
  2. air duct systems free of debris;
  3. Suitable fan rotation;
  4. Motorized shutters and firewall shutters in place and open;
  5. Clean and straightened coil fins;
  6. Doors and traps closed and ends of ducts obstructed by caps;
  7. Outlets installed and connected;
  8. Leak test of ductwork completed;
- .3 Refrigerant networks :
  9. filled and purged networks;
  10. Filters and fittings, clean and in place;

.3 Precision :
- .1 Carry out the test, adjustment and balancing until obtaining results showing a maximum deviation of 5% more or less than the calculation values;
- .2 The measurements made must be accurate to 2% more or less than the actual values.

.4 Adjustments: The control devices must be locked in the operating position and the set points permanently marked according to the requirements of the relevant reference standard.

.5 Completion of Work: Testing and adjustment and balancing work will not be completed until final reports have been approved by the Departmental Representative.

.6 When the final test report is approved by the department's representative, proceed to the system commissioning to demonstrate the operation and maintenance of equipment to the Department prior to final inspection.

1.8 SYSTEMS TESTING

.1 Piping :
- .1 General: Unless otherwise stated, put the system under pressure and ensure that no leak occurs for a period of 4 hours;
- .2 Test piping systems at a pressure equal to 1 1/2 times the service pressure of the system or at a pressure of at least 860 kPa. Choose the higher of these two values;

1.9 EQUIPMENT PERFORMANCE

.1 Demonstration of the performance of equipment installed according to the standard ASHRAE 111 "Practices for measurements, testing, adjusting and balancing of building heating, ventilation, air conditioning and refrigeration systems.

.2 Submit a form demonstrating the performance of the equipment. **(BP)**

1.10 AIR FLOW BALANCING

.1 The firm specializing in testing and balancing must have mechanical balancing experience and must be a certified member of the National Environmental Balancing Bureau (N.E.B.) or Associated Balancing Council (ABBC). (**MP)**

.2 Provide five (5) copies of the final airflow balancing report in the binders with index tabs. The report must be certified by a recognized balancing specialist contracted by the contractor.

.3 Balance systems when complete installation of ducts, equipment, grids and diffusers and automatic regulation is completed. Ensure that the filters are clean and that the air conditioning and heating equipment are able to operate so that the measurements are taken at normal operating temperatures.

.4 Use instruments approved by the departmental representative. Indicate the types. Calibrate all instruments used.

.5 Provide the information below for ductwork:

- .1 Assembly data, manufacturer name, models and sizes, class, fan outlet arrangement designation, engine type, wattage, voltage, number of phases, number of cycles, and current at full load. Location of equipment installation and designation of relevant premises;
- .2 Data, total flow-volume, static pressure, power in watts, speed in rpm and engine current, fresh air volume-volume, power and speed in rpm of the fan;
- .3 Fan test report, flow rate, static pressure, rotational speed in rpm, current and motor power;
- .4 Diagram of the installation :
  - .1 Diagram of the complete installation with actual flows and calculated flow rates, at each feed, return or exhaust air outlet. The diagram should show the numbers of the rooms and the floors.;
  - .2 Data concerning the air flows in the ducts: for the main ducts and the branch lines, the maximum and minimum flows of fresh air and exhaust air; Dimensions of ducts, number of pressure measurement points, sum of velocity measurements, average velocity, actual and calculated flow rates;
  - .3 Measure the flows and pressures obtained with 100% open flaps of fresh air and air and the closed recirculation flap;
  - .4 Make the air readings of the systems with minimum outside air;
  - .5 When two ventilators are installed in series in an H-system and fan-flow-varying elements are installed, make the flow readings of each fan from the minimized flow to the maximum flow with at least two intermediate readings;
  - .6 Identification that the system operates in Equal or proportional fan-tracking. Indicate the positions of the flow variation mechanisms at the minimum / maximum positions and two other intermediate positions.

.6 Calibrating the maximum, minimum flow rates of the terminal elements, including the constant-flow avoidance type terminal elements.

.7 Type and catalog number of the manufacturer, coefficients of application and correction of readings, calculation sections of ducts, speeds and real and calculated flow rates. Orientation of guide vanes or cones.

.8 At diffusers, the control flaps must not cause a pressure drop greater than 25 Pa in order not to generate noise. Balancing with flaps and extractors in ducts.

.9 The permissible deviation between the actual air volumes and the calculated air volumes is 5%.

.10 After the presentation of the report, perform a random check of 10% of the recovery and supply vents, which will be selected by the departmental representative.

.11 Following the cross-checking and acceptance of the test report, mark and lock the settings of all splitters, flaps and other balancing devices.

.12 All documents submitted to the departmental representative in paper format must also be submitted in PDF format.

1.11 TRAINING OF OPERATING STAFF

.1 Provide qualified instructor, tools, equipment and services to train operational and maintenance personnel in the operation, control, adjustment, diagnosis of problems and maintenance of mechanical equipment.

.2 Instructions must be given during normal working hours.

.3 Operations and maintenance manuals should be used for personnel training. At the beginning of the training period, provide four copies of the manuals to the departmental representative.

.4 Training courses should be based on the contents of the Operations and Maintenance Manual, the built drawings, audiovisual materials and others.

.5 If desired, the departmental representative may record the training sessions on video for future reference.

.6 Unless otherwise specified in subsequent sections, staff training will be conducted in a minimum of two (2) sessions. Session 1: Familiarization with the system, operating philosophy, performance and control sequence. Session 2: Answers to questions from the departmental representative, diagnoses, interviews and additional information. The first training session takes place before the systems are accepted and handed over to the departmental representative. The second training session is held approximately four (4) months after possession of the building by the departmental representative.

.7 All training sessions must be preceded by 96 hours written notice of the training date.

.8 Show how to start, operate, regularize, adjust, maintain, and detect defects in each piece of equipment.

.9 Explain to staff all phases of operation and maintenance using operating and maintenance manuals as guides.

.10 Prepare and insert in the operation and maintenance manuals all additional data which have proved necessary during the investigation.

.11 Insert a report in the operations manual indicating the duration of the course and the list of people present during the training sessions. The report is produced by the specialist presenting the course..

1.12 ALLOTTED TIME FOR INSTRUCTIONS

.1 The times allocated to the instructions for each piece of equipment or system are as follows (non-limiting list) :
- .1 section 23 05 01 "Common work results for HVAC : 12 hours of instruction in 3 sessions of up to 4 hours for all equipment;
- .2 section 23 05 48 "Vibration and seismic controls for HVAC piping and equipment" 12 hours of instruction in 3 sessions of up to 4 hours for all equipment;
- .3 section 23 34 01 "HVAC Fans" : 12 hours of instruction in 3 sessions of up to 4 hours for all equipment;
- .4 réseaux aérauliques (section 23 05 53, 23 33 01, 23 37 13, 23 37 20, 23 41 00,) 12 hours of instruction in 3 sessions of up to 4 hours for all equipment;

1.13 OPERATION AND MAINTENANCE MANUAL

.1 Provide operating, maintenance and performance records and incorporate them into the manual prescribed in 01 78 00 "Closeout submittals".

.2 The operating, maintenance and performance records must be approved by the departmental representative before the final acceptance, which will retain the final copies.

.3 The operating records include :
- .1 The circuit diagrams of the control / regulation circuits of each network, including the control / room control circuit;
- .2 A description of each system / installation and its control / regulation devices;
- .3 A description of the operation of each system / installation under various loads, with a set points changing program and indication of seasonal variation;
- .4 instructions for operation of each system / installation and component;
- .5 a description of the actions to be taken in the event of equipment failure;
- .6 a table of valves and a flow diagram;
- .7 a color chart.

.4 Maintenance records include :
- .1 Instructions for the maintenance, repair, operation and identification of defects for each piece of equipment.
- .2 Information on the periodicity of the tasks to be performed, as well as the tools and time required for all these tasks.

.5 Performance records include :
- .1 The performance data provided by the equipment manufacturer specifying the points of use of the equipment after commissioning is complete;
- .2 The results of the performance tests of the equipment;
- .3 Any other specific performance data specified elsewhere in the contract documents;
- .4 The test, adjustment and balancing reports of the systems, in accordance with the requirements of this section.

.6 Approbation :
- .1 For approval, submit two (2) copies of the draft Operations and Maintenance Manual to the departmental representative. It is forbidden to submit entries individually;
- .2 Make the required modifications to the Operations and Maintenance Manual and resubmit it as directed by the Departmental Representative.

.7 Additional Information :
- .1 Prepare additional information sheets and attach them to the operations and maintenance manual when the demonstrations or the execution of the instructions described above show that such sheets are necessary.
- .2 All documents submitted to the departmental representative in paper format must also be submitted in PDF format.

1.14 AS BUILT DRAWINGS

.1 Documents to be kept on site :
- .1 The ministry representative will provide 1 set of mechanical drawings and indicate, as and when required, any changes made during the course of the work. This shall include changes to existing equipment and mechanical appliances, control and control systems and low voltage control wiring;
- .2 use a different colored indelible pen for each service;
- .3 Keep these drawings on-site and make them available to the persons concerned for reference and verification purposes.

.2 As built drawings:
- .1 Before beginning the tests, balancing and adjustment of the systems, complete the development of the drawings after execution;
- .2 Identify each drawing in the lower right corner, in letters at least 12 mm high, as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED AND SHOWS THE MECHANICAL SYSTEMS / APPARATUSS SUCH AS THEY WERE INSTALLED ". (Signature of Contractor) (Date);
- .3 Submit the drawings to the departmental representative for approval, and make corrections as directed. Technical questions / modifications documents are not accepted as red-painted annotated drawings.
- .4 Carry out testing, balancing and adjustment of systems, apparatus and networks taking into account the indications in the drawings;

.5 Submit reproducible copies of completed completed drawings, together with operating and maintenance manuals.

.3 In addition to the above, comply with the requirements of Section 01 78 00 – Closeout submittals.

.4 All documents submitted to the departmental representative in paper format must also be submitted in PDF format on a computer medium.

1.15 TECHNICAL PROCEDURES

.1 Submit technical procedures for carrying out tests and balancing of refrigerant networks and air ducts in accordance with the requirements of the applicable codes and standards and the requirements of this section. **(BP)**

PART 2 - PRODUCT (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 TABLE 23 05 93.1 PIPE TESTS

PIPE AND EQUIPEMENTS TESTING No	(SECTION/TESTING NO)		
Test the piping in accordance with the requirements of section 23 05 93 "TESTING, ADJUSTING AND BALANCING FOR HVAC" and according to the Quebec Plumbing Code.			
Test equipment in accordance with manufacturer's instructions.			
Date :		Place	
Outside temperature :	[ ] °C		
Attendees :	Nom :	Compagnie :	
Reference to drawings :			
Axes :	[ ] to [ ]	Axes :	[ ] to [ ]
Section of specifications :		Description :	
Description tested pipe:			
Description of tested equipement :			
Diameter of tested pipe :	[ ] mm		
Pressure's test :	[ ] kPa	Time :	[ ] h
Accepted test :	[ ]	Contracor:	
		Departmental representative	
Test to be repeated :	[ ]		
Notes :			

3.2 TABLEAU 23 05 93.2 PRESSURE TESTS - DUCTS

PRESSURE TESTS - DUCTS			
Note: Test according to SMACNA leak test method for ducts. The tests shall not indicate the presence of an audible air leak.			
Project :		No :	
System no :		Sealing class : [ ]	24 rectangular < 250 kPa 12 rond 6 rectangular > 500 kPa 3 rond
Reference to drawings :		Pressure's test :	[ ] Pa
Axes :	[ ] to [ ]	Axes :	[ ] to [ ]

		ELIGIBLE LEAKS		READINGS								CONVERTING IN CURRENT FLOW l/s
	Area (square feet)	PCM Factor /sq.ft	PCM Loss	Diameter		Pressure Pa		Date	By	Check	Débit PCM	
				Orifice	Tube	Duct	Through the orifice					
Total system												

Section tested												
Note: Use the SMACNA method and convert the final results to l/s in the last column.												

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 : Submittal procedures.

.2 Section 23 05 01 : Use of HVAC system during construction.

.3 Section 23 05 53 : Mechanical identification

1.2 REFERENCES

.1 Insulate air ducts in accordance with "Energy Conservation Measures in New Buildings" issued by the National Building Code Deputy Committee (NBCC) and in accordance with the "Energy Conservation Act In the building "and" Regulation respecting the economy of energy in new buildings "published by the official publisher of Québec.

.2 Degree of Fire Resistance :
- .1 The materials used shall conform to NFPA 90A and have a maximum flame spread of 25 and a maximum smoke index of 50 in accordance with ASTM C411, NFPA 255 and CAN4-S102 -M;
- .2 The prescribed materials that have been approved for specific use by the competent authorities will be acceptable for the execution of the present work;
- .3 Materials tested in accordance with ASTM C411 shall not ignite, ignite, glow or smoke when exposed to normal operating temperatures.

.3 American Society for Testing and Materials, (ASTM) :
- .1 ASTM C411, Standard test method for hot-surface performance of high-temperature thermal insulation;
- .2 ASTM B209-06 Standard Specification for Aluminium and Aluminium-Alloy Sheet and Plate.

.4 Canadian General Standards Board (CGSB) :
- .1 ONGC 51-GP-9M, Thermal Insulation, Mineral Fiber, Sleeving for Piping and Round Ducting;
- .2 CAN/CGSB-51.12,Thermal Insulating and Finishing Cement;
- .3 ONGC 51-GP-2M, Thermal Insulation, Mineral Fiber, Sleeving for Piping and Round Ducting;
- .4 ONGC 51-GP-52M, Vapor Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation;
- .5 ONGC 51-GP-11M, Thermal Insulation, Mineral Fiber, Blanket, for Piping, Ducting, Machinery and Boilers;
- .6 ONGC 51-GP-10M, Thermal Insulation, Mineral Fiber, Block or Board, for Ducting, Machinery and Boilers;
- .7 ONGC 51-GP-53M, Jacketing, Polyvinyl Chloride Sheet, for Insulating Pipes, Vessels and Round Ducts;
- .8 CAN/ONGC-51.40 M80, Thermal Insulation, Flexible, Elastomeric, Unicellular, Sheet and Pipe Covering.

.5 Underwriters Laboratories of Canada (ULC).

.6 National Fire Protection Association (NFPA) :
- .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems;
- .2 NFPA 255, Test of surface burning characteristics of building materials.

.7 Thermal Insulation Association of Canada(TIAC).

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	PB/MP	PRESCRIPTIONS	MOMENT (FREQUENCY)	RECORDING	RESPONSABILITY
3.1.3.	MP	Certification of the workforce.	Before the work begins.	Labor Certificates.	Contractor
1.11	BP	Technical procedures.	Before the work begins.	Letter of transmission. Recording of the review of technical procedures.	Contractor
1.4	BP	Workshop drawings and / or technical descriptions of the products.	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation.	Letters of transmission. Recording of shop drawings and / or technical descriptions.	Contractor
1.5	MP	Samples.	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation.	Letters of transmission. Recording the sample review.	Contractor
1.12	BP	Ownership analysis of products.	At the delivery.	Certificates of property analysis.	Contractor
1.9	BP	Inspection of heat insulation.	At each reception.	Inspection reports.	Contractor
1.10	BP	Inspection of works	According to the determined frequency	Inspection reports	Contractor

BP: POINTBREAK **MP**: MONITORING POINT

1.4 WORKSHOP DRAWINGS AND / OR TECHNICAL DESCRIPTIONS OF THE PRODUCTS

.1 Submit shop drawings and / or technical product descriptions in accordance with Section 01 33 00 "Submittal procedures".

.2 Have the manufacturer verify the documentation provided, including insulation laying methods, details on the construction of heat insulation elements for pipes, fittings, piping and valves, and recommendations for the execution of joints and fittings. Before submission to the Departmental Representative..

1.5 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 "Submittal procedures".

.2 Submit a complete set of each proposed type of thermal insulation complex including the heat insulating material proper, the coating plaster and the glue. Place the sample on a 12 mm plywood panel. Place under the sample a typewritten label indicating the type of service.

1.6 DEFINITIONS

.1 Concealed Elements: Isolated mechanical elements in trenches, niches, floor or wall voids, ducts or over suspended ceilings.

.2 Apparent elements: elements that are not concealed (as defined in 1.6.1).

.3 Exterior elements: elements located outside the building.

1.7 DESCRIPTION OF THE SYSTEMS TO BE CALIBRATED

.1 See details on mechanical drawings and insulation panel on plan XX.

1.8 COMPATIBILITY OF COMPONENTS

.1 All mechanical anchors, adhesives, sealants, spray coatings, sealants, heat insulation and sealants must be compatible with the materials to be insulated. Consequently, they must not soften, corrode or attack these materials, either wet or dry. Apply these products to the ambient temperatures recommended by the manufacturer.

1.9 DELIVERY INSPECTION

.1 Conduct inspection of insulation and accessories on site delivery and submit inspection reports.

1.10 INSPECTION OF WORK

.1 Inspection of heat insulation installation at completion of work. At each inspection, submit an inspection report including, but not limited to, the following information :
- .1 the scope of the audited work;
- .2 verification of concealed facilities;
- .3 checking installation of insulation in accordance with manufacturer's recommendations;

1.11 TECHNICAL PROCEDURES

.1 Before beginning work, provide technical procedures for the installation of the following equipment :
- .1 Installing insulation.
- .2 Any other required procedure.

1.12 PRODUCT PROPERTY ANALYSIS

.1 Prior to commencement of work, provide proprietary product analysis on the following items :
- .1 Thermal insulation.
- .2 Vapor barrier.
- .3 Shelling.

.4 Any Other Product Used.

1.13 MANAGEMENT AND DISPOSAL OF RESIDUAL MATERIAL

.1 Dispose of residual materials and packaging materials of any kind using methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2. PRODUCTS

2.1 TYPE D-1

.1 Uses: for round air ducts that are visible and not visible and rectangular in appearance, whose operating temperature is less than 65 ° C:
- .1 Aeraulic Air Supply Systems.
- .2 Cooling air supply air systems.
- .3 Fresh air intake (up to heating element or up to mixing section for systems without heating, inclusive)
- .4 Exhaust ducts (to motorized or gravity shutter inclusive) for a minimum distance of 3 m.

.2 Matérial :
- .1 Fiberglass mattress (for thermal insulation of air ducts), with a thermal resistivity of 26 m C / W, in accordance with CGSB 51-GP-11M, with vapor barrier according to CGSB 51-GP-52M.

.3 Insulation thickness 25 mm, for entire distribution system;

.4 Insulation thickness 50 mm for:
- .1 for air intakes (up to the heating element or up to the mixing section for systems without heating, inclusive);
- .2 for exhaust ducts (a minimum distance of 3 m from the outside).

2.2 TYPE D-2

.1 Uses: for apparent rectangular cold air ducts, the operating temperature of which is less than 65 ° C :
- .1 Aeraulic Air Supply Systems.
- .2 Cooling air supply air systems.
- .3 Fresh air intake (up to heating element or up to mixing section for systems without heating, inclusive)
- .4 Exhaust ducts (to motorized or gravity shutter inclusive) for a minimum distance of 3 m;

.2 Matérial :
- .1 Rigid fiberglass panel (for thermal insulation of air ducts) with thermal resistivity 29.7 m ° C / W, in accordance with CGSB 51-GP-10M, and vapor barrier, liner and coating material The CGSB 51-GP-52M standard;

.3 Insulation thickness 25 mm, for entire distribution system;

.4 Insulation thickness 50 mm for :

.1 for air intakes (up to the heating element or up to the mixing section for systems without heating, inclusive);
.2 for exhaust ducts (to the motorized or gravity flap, inclusive, a minimum distance of 3 m).

2.3 TYPE D-3

.1 Uses: for external pipes with a flow of air at a temperature below 40 ° C.
  .1 Roof Venting Ducts (from inside to Gravity Flap inclusive) (VE4-X).

.2 Fiberglass-reinforced polyisocyanurate foam rigid panel coated with aluminum foil on both sides and an acrylic coating on the outside. Completely waterproof. R6.5 / po. Composed of two rows installed with sealed overlapping joints. Cover over the insulated surface of an aluminum liner.

.3 Thickness of insulation: 50 mm in two thicknesses of 25 mm, except
  .1 Roof vent ducts after fan up to gravity flap inclusive (VE4-X) which will be covered with 25mm insulation.
  .2 VE4-X fan casing and connectors without insulation.

2.4 FASTENING ACCESSORIES

.1 Self-adhesive tape 100 mm in width, with a flame spread of 25 or less and a smoke index of not more than 50.

.2 Glue :
  .1 Contact adhesive :
    .1 Quick-setting adhesive for sealing joints and seams of unicellular flexible insulations;

  .2 Glue to seal overlaps:
    .1 Quick-setting adhesive for sealing joints and vapor barrier overlaps;
  .3 For canvas shirts:
    .1 washable glue for bonding the heat insulating liner to the heat insulating material;

.3 Anchors:
  .1 Dowels to be welded to the duct after the insulation is placed, 4 mm in diameter, with a head of 35 mm diameter, of a length appropriate to the thickness of the insulation;
  .2 Anchors to be welded to the conduit prior to installation of the 2.0 mm diameter insulation of a length appropriate to the thickness of the insulation with a 32 mm square nylon square retaining plate;

.4 Fasteners :
- .1 Stainless steel wire annealed soft 1.2 mm diameter, type 304;
- .2 Hexagonal mesh of 25 mm, 0.9 mm thick, type 304 of stainless steel;
- .3 Galvanized steel belt measuring 12 x 0.4 mm;
- .4 Aluminum strips.

2.5 JACKETS

.1 Aluminium :
- .1 Aluminum casings in accordance with CSA HA Standard. Series M: used on all exterior insulated elements :
  - .1 Corrugated or corrugated aluminum alloy liners, 0.4 mm thick, with longitudinal sliding joints and 50 mm wide overlapped end joints, with interior surface coated, in the factory, A protective coating, also equipped with aluminum alloy covers, with metal fasteners;
  - .2 Jackets for fittings, with 0.4 mm thick aluminum alloy die-casting elements, with an interior surface coated with a protective coating in the factory;

.2 Canvas : used on all exposed interior insulation elements:
- .1 Shirts used on exposed elements: large cotton canvas, plain weave, compact, rigid and ULC approved, with a mass of 220 g / m2.

PART 3. EXECUTION

3.1 POSE

.1 Carry out work in accordance with requirements of relevant national standards TIAC.

.2 Install the insulation material after completion of the leakage tests and the report of results approved by the ministry representative. Ensure that the surfaces of the insulation and insulation elements are clean and dry during laying and during the application of a finish coat.

.3 Have the work done by skilled insulation workers and a member of the Canadian Insulation Association.

.4 Install the heat insulating material and the vapor barrier continuously over the entire length of the duct and over the entire surface to be insulated. The insulation material and the vapor barrier shall not have openings for the passage of the elements, supports and suspensions or be interrupted at the location of the sleeves and fittings, or protruding joints.

.5 Install heat insulating material to provide a smooth, even surface.

.6 Install heat insulation material and apply coatings and finishes as recommended by manufacturer.

.7 Install 1.0 mm thick metal angle inserts on heat insulation of all air lines in mechanical equipment rooms.

.8 Apply flame retardant coating on linen shirts.

.9 Do not interrupt the aluminum lining of the brackets.

.10 Outside, install rigid insulation with protective shield to supports.

3.2 CALORIFUGAL MATERIAL FOR TYPE D

.1 General:
- .1 Fix and sealing the vapor barrier with a vapor-proof adhesive;
- .2 In the case of a multi-thickness insulation, shift the horizontal and longitudinal joints.

.2 Mechanical Fasteners:
- .1 In the case of rectangular ducts, cover 50% of the surface of the adhesive walls and place on each wall at least two rows of soldering pins arranged at a maximum distance of 200 mm.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 35 29.06 - Health and Safety Requirements.

.3 Section 01 74 11 – Cleaning.

.4 Section 01 78 00 - Closeout Submittals.

.5 Section 23 05 00 – Common work results for HVAC.

.6 Section 22 05 01 - Common work results for plumbing.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME-B16.3-2006, Malleable-Iron Threaded Fittings: Classes 150 and 300.

.2 ASME-B16.9-2007, Factory-Made Wrought Steel Buttwelding Fittings.

.2 ASTM International

.1 ASTM A47/A47M-99(2004), Standard Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM B61-08, Standard Specification for Steam or Valve Bronze Castings.

.4 ASTM B75M-99(2005), Standard Specification for Seamless Copper Tube [Metric].

.3 Canadian Environmental Protection Act (CEPA)

.1 CCME PN 1326-2008, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems for Petroleum Products and Allied Petroleum Products.

.4 CSA International

.1 CSA-B139-09, Installation Code for Oil Burning Equipment.

.2 CSA-B140.0-03, Oil Burning Equipment: General Requirements.

.3 CSA-C282-05, Emergency Electrical Power Supply for Buildings.

.5 Green Seal Environmental Standards (GSES)

.1 Standard GS-11-2008, 2nd Edition, Paints and Coatings.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.7 Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)

.1 MSS-SP-80-08, Bronze Gate, Globe, Angle and Check Valves.

.8 National Association of Corrosion Engineers (NACE)

.1 NACE SP0169-2007, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

.9 National Fire Code of Canada (NFCC 2015)

.10 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2007, Architectural Coatings.

.11 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC S603.1-03, External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids.

.2 ULC ORD-C107.12-1992, Line Leak Detection Devices for Flammable Liquid Piping.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for piping, fittings and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Indicate on manufacturer's catalogue literature the following: valves.

.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Indicate VOC's for adhesive and solvents during application and curing.

.4 Test Reports:

.1 Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.5 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.6 Manufacturers' Instructions: provide manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 Sustainability Standards Certification:

.1 Low-Emitting Materials: [provide listing of adhesives and sealants paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

.2 Ensure piping is installed by company authorized by authority having jurisdiction.

PART 2 PRODUCTS

2.1 FILL VENT AND CARRIER PIPE

.1 Materials as per CSA-B139, CEPA SOR/2008-197, NFCC.

.2 Steel: to ASTM A53/A53M, Schedule 40, continuous weld or electric resistance welded, screwed.

.3 Copper: type L, soft copper tubing, to ASTM B75M, in long lengths.

2.2 OUTER CASING

.1 EMPTY.

2.3 STEEL PIPE COATING

.1 Bituminous paint: in accordance with manufacturer's recommendations.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

.1 Primer: maximum VOC limit to Standard GS-11.

.2 Paints: maximum VOC limit to Standard GS-11.

2.4 JOINTING MATERIAL

.1 Screwed fittings: Teflon tape or pulverized lead paste.

.2 Brazed fittings: [85/15].

2.5 FITTINGS

.1 Steel:

.1 Malleable iron: screwed, banded, Class 150 to ASME-B16.3.

.2 Welding: butt-welding to ASME-B16.9.

.3 Unions: malleable iron, brass to iron, ground seat, screwed, to ASTM A47/A47M.

.4 Nipples: Schedule 40, to ASTM A53/A53M.

.2 Copper:

.1 Piping: brazed type.

.2 Connections to equipment: compression.

2.6 GATE VALVES

.1 NPS 2 and under, screwed bonnet: rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, solid wedge disc.

2.7 GLOBE VALVES

.1 NPS 2 and under, screwed: to MSS-SP-80, Class 125, 860 kPa, bronze body, screwed over bonnet, renewable disc suitable for oil service.

.1 Lockshield handles: as indicated.

2.8 BALL VALVES

.1 NPS 2 and under: bronze body, screwed ends, TFE seal, hard chrome ball, 4 MPa, WOG.

2.9 SWING CHECK VALVES

.1 NPS 2 and under, screwed: to MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc suitable for oil service, screw in cap, regrindable seat.

2.10 LUBRICATED PLUG COCKS

.1 NPS 2 and under, screwed: to ASTM B61, Class 150, 1 MPa, bronze body.

2.11 DUCT HEATER CC1 AND CC2

.1 See mechanical plans.

PART 3 EXECUTION

3.1 APPLICATION

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

3.2 PIPING

.1 Install piping in accordance with Section22 05 01 – Plumbing – General Prescriptions, supplemented as specified.

.2 Install oil piping system in accordance with CSA-B139.

.3 Slope piping down in direction of storage tank unless otherwise indicated.

.4 Underground piping to be protected in conformance with CAN/ULC-S603.1.

.5 Above ground piping to be protected from physical impact due to impact.

.6 Piping inside building:

.1 Ensure piping in solid flooring is installed to CSA-B139.

.2 Use approved fitting to CSA-B139 for piping.

.3 Install filter, gate valve, and fire valve at burners.

.7 Fill, vent, suction and return piping outside building:

.1 Steel piping welded throughout except at tanks where electrically isolating fittings are used.

.2 Grading: slope piping at 1% minimum back to tanks.

.8 Clearly label piping runs in legible form indicating;

.1 Piping product content.

.2 Direction of flow.

.3 Identify transfer points in piping systems to CPPI Colour-Symbol System to Mark Equipment and Vehicles for Product Identification

3.3 VALVES

.1 Install valves with stems upright or horizontal unless approved otherwise by Departmental Representative.

.2 Install gate valves at branch take-offs, to isolate pieces of equipment and as indicated.

.3 Install globe valves for balancing and in by-pass around control valves.

.4 Install swing check valves and as indicated.

.5 Install plug cocks as indicated.

3.4 OIL TRANSFER PUMPS

.1 Equip pumps with check valve installed below suction pump to permit contents of pipe to drain back to storage tank if suction is broken.

.2 Install as indicated.

.3 Install gate -valves on inlet and discharge connections.

.4 Install pressure gauge at pump discharge, compound gauge on pump inlet connection.

.5 Install relief valve in pump discharge piping with relief valve discharge pipe to return line to tank.

3.5 OIL FILTERS

.1 Install ULC approved as indicated in supply line to.

.2 At time of acceptance, replace filter cartridge with new.

3.6 OVERFILL AND SPILL PROTECTION

.1 To CSA-B139.

3.7 CLEANING

.1 Clean in accordance with Section manufacturer's written recommendations, supplemented as follows:

.1 Flush after pressure test with number 2 fuel oil for a minimum of two hours. Clean strainers and filters.

.2 Dispose of fuel oil used for flushing out in accordance with requirements of authority having jurisdiction.

.3 Ensure vents from regulators, control valves are terminated in approved location and are protected against blockage and damage.

.4 Ensure entire installation is approved by authority having jurisdiction.

.5 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29.06 - Health and Safety Requirements.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A480/A480M last edition, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M last edition, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.

.3 ASTM A653/A653M last edition, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (LCPE), 1999, ch. 33.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.5 National Fire Protection Agency Association (NFPA).

.1 NFPA 90A last edition, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B last edition, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

.3 NFPA 96 last edition, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

.6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition last edition and Addendum No. 1, last edition.

.2 SMACNA HVAC Air Duct Leakage Test Manual, last edition, 1st Edition.

.3 IAQ Guideline for Occupied Buildings Under Construction last edition, 1st Edition.

.7 Transports Canada (TC).

.1 Transportation of Dangerous Goods Act (TDGA), 1992, ch. 34.

1.3 SUBMITTAL

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets for the following :

.1 Sealants;

.2 Tape;

.3 Proprietary Joints.

1.4 QUALITY ASSURANCE

.1 Reliability of technical data

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

.2 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Indoor Air Quality (IAQ) Management Plan

.1 Develop and implement an Indoor Air Quality (IAQ) Management Plan for construction and preoccupancy phases of building.

.2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction

PART 2 PRODUCT

2.1 SEAL CLASSIFICATION

.1 La classe d'étanchéité à l'air des conduits doit être déterminée selon les données du tableau ci-après.

Maximum Pressure Pa	SMACNA Seal Class
500	A
250	B
125	C]
125	Unsealed

.2 Seal Classification

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant tape or combination thereof.

.3 Class C: transverse joints and connections made air tight with gaskets or sealant tape or combination thereof. Longitudinal seams unsealed.

.4 Unsealed seams and joints.

2.2 SEALANT

.1 Sealant: oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

2.3 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.4 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.5 FITTINGS

.1 Fabrication : to SMACNA.

.2 Radiused elbows

.1 Rectangular: standard radius, Centreline radius:1.5 times width of duct.

.2 Round: smooth radius five pieces. Centreline radius: 1.5 times diameter.

.3 Mitred elbows, rectangular

.1 To 400 mm: with single thickness turning vanes.

.2 Over 425 mm: with double thickness turning vanes.

.4 Branches

.1 Rectangular main and branch: 45 degrees entry on branch.

.2 Round main and branch: enter main duct at 45 degrees with conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Transition

.1 Diverging: 20 degrees maximum included angle

.2 Converging: 30 degrees maximum included angle.

.6 Offsets

.1 Full, short radiused elbows as indicated.

.7 Obstruction deflectors: maintain full cross-sectional area.

.1 Maximum included angles: as for transitions.

2.6 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation.

.2 Fire stopping material and installation must not distort duct.

2.7 GALVANISED STEEL

.1 Lock forming quality: to ASTM A 653/A 653M, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: toSMACNA proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

2.8 HANGERS AND SUPPORTS

.1 Hangers and Supports:

.2 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.1 Maximum size duct supported by strap hanger: 500 mm.

.2 Hanger configuration: to SMACNA.

.3 Hangers: galvanized steel angle with galvanized steel rods to SMACNA

.4 Upper hanger attachments

.1 For concrete: manufactured concrete inserts.

.2 For steel joist: manufactured joist clamp or steel plate washer.

.3 For steel beams: manufactured beam clamps

PART 3 EXECUTION

3.1 GENERAL

.1 Do work in accordance with NFPA 90A, NFPA 90B and SMACNA.

.2 Do not break continuity of insulation vapour barrier with hangers or rods.

.1 Insulate strap hangers 100 mm beyond insulated duct. Ensure diffuser is fully seated.

.3 Support risers in accordance with SMACNA as indicated.

.4 Install breakaway joints in ductwork on sides of fire separation.

.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with SMACNA.

3.3 WATERTIGHT DUCT

.1 Provide watertight duct for :

.1 Dishwasher exhaust;

.2 Fresh air intake;

.3 Minimum 3000 mm from duct mounted humidifier in all directions.

.4 As indicated.

.2 Form bottom of horizontal duct without longitudinal seams.

.1 Solder or weld joints of bottom and side sheets.

.2 Seal other joints with duct sealer.

.3 Slope horizontal branch ductwork down towards hoods served.

.1 Slope header ducts down toward risers.

.4 Fit base of riser with 150 mm deep drain sump and 32 mm drain connected, with deep seal trap and valve, and discharging to open funnel drain as indicated.

3.4 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

3.5 LEAKAGE TESTS

.1 Refer to Section 23 05 93 - Pressure Testing of Ducted Air Systems.

.2 In accordance with SMACNA HVAC Duct Leakage Test Manual.

.3 Do leakage tests in sections.

.4 Make trial leakage tests as instructed to demonstrate workmanship.

.5 Do not install additional ductwork until trial test has been passed.

.6 Test section minimum of 30 m long with not less than three branch takeoffs and two 90 degrees elbows.

.7 Complete test before performance insulation or concealment work.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 23 05 01 : Use of HVAC systems during construction.

.2 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment.

1.2 REFERENCES

.1 Underwriters Laboratories of Canada (ULC) :
- .1 CAN/ULC S110 :Standard Methods of Test for Air Ducts;
- .2 ULC S505 : Fusiblw Links for Fire Protection Services;
- .3 UL 181 : Standard for Factory Made Air Ducts and Air Connectors;
- .4 CAN/ULC S109 : Flame tests of flame resistant fabrics and films;
- .5 CAN/ULC-S112 :Standard Method of Fire Test of Fire-Damper Assemblies;
- .6 CAN/ULC-S112.2 : Standards Method of Fire Test of Ceiling Firestop Flap Assemblies.

.2 National Fire Protection Association (NFPA) :
- .1 NFPA 90A : Standard for the installation of Air-Conditioning and Ventilating Systems;
- .2 NFPA 90B : Standard for the installation of Warm Air Heating and Air-Conditioning Systems
- .3 NFPA 96 : Standard for Ventilation Control and fire Protection of Commercial Cooking Operations.

.3 Sheet Metal And Air Conditioning Contractors' National Association, inc. (SMACNA) :
- .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible;
- .2 SMACNA : HVAC Duct Leakage Test Manual.

.4 Association canadienne de normalisation (CSA) :
- .1 CSA B228.1 : Pipe Ducts and Fittings for Residential Type Air Conditioning Systems.

.5 American Society for Testing and Materials (ASTM) :
- .1 ASTM A480/A480M : Standard Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting-Steel Plate Sheet, and Strip;
- .2 ASTM A 635/A 635M , Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for;
- .3 ASTM A 653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy-Coated (Galvannealed) by Hot-Dip Process;
- .4 ASTM C177 : Standard test method for steady-state heat flux measurements and thermal transmission properties by means of the guarded-hot-plate apparatus.

.6 Canadian General Standards Board (CGSB) :
.1 ONGC 51-GP-10M : Thermal Insulation, Mineral Fiber, Block or Board for Ducting;
.2 ONGC 51-GP-11M : Thermal Insulation, Mineral Fiber, Blanket, for Piping, Ducting, Machinery and Boilers.

.7 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) :
.1 ASHRAE Handbook, Fundamentals, HVAC Systems and Equipment, HVAC Application and Systems Volumes, de l'ASHRAE.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT (FREQUENCY)	RECORDING	RESPONSABILITY
	MP	Certification of labor in accordance with Section 23 05 01.	Before the work begins.	Labor Certificates.	Contractor
	BP	Workshop drawings in accordance with Section 23 05 01.	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation.	Letters of transmission. Recording of the shop drawings.	Contractor
	BP	Certificate of conformity in accordance with Section 23 05 01.	At the delivery.	Documents of attestation of conformity.	Contractor
1.4	BP	Inspection of ducts and accessories.	At each reception.	Inspection reports.	Contractor
2.5	BP	Air leak tightness tests.	Before commissioning.	Test reports.	Contractor
1.5	BP	Certification of labor in accordance with Section 23 05 01.	Before commissioning and / or according to the determined frequency	Inspection reports	Contractor

BP: BREAKPOINT **MP** : MONITORING POINT

1.4 DELIVERY INSPECTION

.1 Conduct inspection of ducts and air distribution accessories when they are delivered to the site and submit inspection reports .

1.5 INSPECTION OF WORKS

.1 Inspect the installation of air distribution ducts and accessories at the end of the work. At each inspection, submit an inspection report including, but not limited to, the following information :
.1 The scope of the audited work;
.2 The fixing;
.1 Verification of concealed facilities;
.2 Verifying the installation of the air distribution ducts in accordance with the manufacturer's recommendations;

1.6 MANAGEMENT AND DISPOSAL OF RESIDUAL MATERIAL

.1 Dispose of residual materials and packaging materials of any kind using methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2. PRODUCTS

2.1 CLASSIFICATION OF AIR DUCTS

SYSTTEM	CLASS OF LEAK	SEALING CLASS	MAXIMUM PRESSURE	NOTES
ALL	12	B	750	Factory manufactured housing
ALL	24	C	500	The rest of the system
ALL	24	C	250	N/A

.1 The air ducts are classified as follows :

CLASS OF LEAK		MAXIMIM PRESSURE	SEALING CLASS
ROUND	RECTANGULAR	(Pa)	(SMACNA)
3	6	2500	A
3	6	1500	A
3	6	1000	A
6	12	750	B
12	24	500	C
12	24	250	C
12	24	125	C
24	48	125	C

2.2 CLASSIFICATION OF SEAL TYPES (BY AIR)

.1 Class A: longitudinal joints, transverse seals and sealed joints with sealant and sealant tape.

.2 Class B: longitudinal joints, transverse seams and sealed joints with sealant, sealing tape or combination thereof.

.3 Class C: transverse seals and sealed joints by means of sealant, sealing tape or combination of sealant. Unsealed longitudinal seams.

2.3 SEALING PRODUCT

.1 Sealant: water-based, water-based, polymer-based, flame-resistant, oil-resistant, air-tight, temperature-resistant to -30 degrees Celsius to 93 degrees Celsius

2.4 SEALING TAPE

.1 Sealing tape: Fiberglass tape, loose, polyvinyl-treated, 50 mm wide.

2.5 CONNECTIONS

.1 Manufacturing: SMACNA.

.2 Elbows with rounded corners
- .1 Rectangular pipes: standard or small radius elbows with single-layer deflectors; Radius of curvature corresponding to 1.5 x the width of the duct.
- .2 Circular ducts: elbows with large radii elbows five (5) pieces; Radius of curvature corresponding to 1.5 x the diameter of the duct.

.3 Bright angled elbows - Rectangular ducts
- .1 Ducts with a diameter of 400 mm or less: elbows with single-sided deflectors.
- .2 Ducts with diameter greater than 400 mm: elbows with double-layer deflectors.

.4 Branch Connections
- .1 Rectangular main and bypass ducts: branch branch on branch, with a radius of curvature corresponding to 1.5 x the width of the conduit entered at 45 degrees on bypass.
- .2 Circular main and bypass ducts: main channel inlet at 45 degrees with transition fitting.
- .3 Motorized flaps shall be placed in the bypass ducts near the main duct connections.
- .4 Main branches shall be fitted with a guide blade.

.5 Transition elements
- .1 Divergent elements: Opening angle not more than 20 degrees.
- .2 Converging elements: Opening angle not more than 30 degrees.

.6 Delayed Elements
- .1 Elbows with large radius at small radius as indicated.

.7 Barrier Deflectors: Keeping the same useful section.
- .1 Maximum angles of aperture shall be the same as for transition elements.

2.6 FIREWORKS

.1 Install retaining brackets around duct on each side of firewall.

.2 Fire-resistant material and its installation shall not deform the conduit.

2.7 LOW PRESSURE GALVANIZED STEEL AIR DUCTS

.1 Collapsible steel conduits for forming staples, in accordance with ASTM A 653M.

.2 Rectangular pipe: manufacturing.

RECTANGULAR CONDUITS SUBJECT TO PRESSURES UP TO 500 Pa				
BIGGEST SIDE	**CALIBER**	**JOINT**	**MAXIMUM DISTANCE**	**SUPPORT**
de 75 mm to 300 mm	0,55 mm	S and slide	2400 mm	U-shaped iron 25x25x3mm to 2400 cc with shank 6 mm
de 301 mm to 455 mm	0,70 mm	S and slide	2400 mm	U-shaped iron 25x25x3mm to 2400 cc with shank 6 mm
de 480 mm to 750 mm	0,70 mm	T standing 25 mm	1200 mm	Corner 40x40x3mm to 2400 c.c with rod 6 mm
De 755 mm to 1050 mm	0,85 mm	T standing 25 mm	1200 mm	Corner 40x40x3mm to 2400 c.c with rod 6 mm
de 1075 mm to 1400 mm	0,85 mm	T standing 40 mm	1200 mm	Corner 40x40x5mm to 2400 cc with rod 10 mm
De 1425 mm to 1700 mm	1,00 mm	T standing 40 mm	1200 mm	Corner 50x50x5mm to 2400 c.c with 10 mm rod
De 1725 mm to 2200 mm	1,31 mm	Twin angles 40x40x5mm	1200 mm	Corner 50x50x7mm to 2400 c.c with 10 mm rod
Note: For dimensions greater than those indicated, consult SMACNA				

.3 Conduit rond : Les conduits ronds apparents (voir définition section 23 07 13) seront de type « spiral ».

2.8 SUPPORTS AND SUSPENSIONS

.1 Suspension straps: of the same material used for the duct, but of the thickness immediately superior to that of the duct. Maximum width of the ducts to be supported by straps: 500 mm.

.2 Suspension Configuration: Based on SMACNA.

.3 Angles and suspension rods: Galvanized steel angles retained by galvanized steel rods according to SMACNA recommendations and specifications in the piping table.

.4 Suspension Fasteners:
- .1 for fastening in concrete structures: concrete anchors, prefabricated:
- .2 for fastening to steel beams: steel brackets or brackets, prefabricated
- .3 for mounting on steel beams: pre-fabricated stirrups

2.9 FLEXIBLE CONNECTIONS

.1 Fans and aeraulic units shall be fitted with neoprene-coated glass fabric fittings in accordance with CAN / ULC S109, manufactured in the factory. Flexible fittings shall not be more than 100 mm in length between the metal parts to be joined and shall be laid with the clearance strictly necessary to prevent the transmission of vibrations.

.2 Flexible exterior fittings shall be designed and approved to withstand external conditions in the area.

.3 Allow 50 mm movement for low pressure fans.

.4 Install a flat braid fitting on both sides of the flexible sleeve for continuity of masses

2.10 ACCESS DOORS FOR AIR DUCTS

.1 As indicated in the drawings and wherever necessary for the maintenance and inspection of systems such as fire dampers, manual and motorized flaps, drain fittings, coils, humidifiers, probes, ducts shall be provided Of doors allowing access to these equipments. The doors will be at most 300 mm from the accessories to be maintained and will be provided on the side easier to access for maintenance. Demonstrate that it is possible to remove accessible equipment. Provide doors of at least 450 x 450 unless the duct or ducts can not allow it.

.2 Non-insulated ducts: double-walled ("sandwich construction") doors, of the same material as that used for the ductwork, but of the immediately upper thickness, which shall not be less than 0.6 mm, with Angles of metal.

.3 Insulated pipes: double-walled doors ("sandwich construction"), of the same material as that used for the manufacture of pipes, but of the immediately greater thickness, which shall not be less than 0.6 mm, with angular frame Metal and rigid insulation made of 25 mm thick fiberglass.

.4 Sealing Gaskets: Neoprene shall not be detected around the perimeter of the door.

.5 For high-speed systems, doors must be prefabricated and sandwich constructed.

.6 Hardware Parts :
- .1 For doors up to 300 x 300 mm: 2 latches for chassis, with safety chains;
- .2 For doors measuring between 301 and 450 mm: 4 latches for chassis, with safety chains;
- .3 For doors measuring between 451 and 1000 mm: 1 piano hinge and at least 2 latches for frames;
- .4 For doors measuring more than 1000 mm: 1 piano hinge and 2 handles maneuverable respectively from inside and outside;
- .5 Door holders;
- .6 Glass portholes of 300 x 300 mm.

.7 Location :
- .1 Where required to allow access to smoke flaps and fire dampers;
- .2 Where required to allow access to control and airflow swing flaps;
- .3 Where required to allow access to devices requiring periodic maintenance;
- .4 Where required, as required by the code;
- .5 Where required to allow access to reheating batteries;
- .6 Other locations.

2.11 DÉFLECTORS

.1 Single-layer, aerodynamically-shaped, double-deck, factory or shop-made deflectors conforming to SMACNA recommendations and indications.

2.12 CONNECTIONS FOR TEST INSTRUMENTS

.1 1.6 mm steel elements, galvanized after manufacture.

.2 Fittings consisting of a cam handle with chain and a neoprene expansion pad.

.3 Inside diameter: at least 28 mm; Length: suitable for the thickness of the insulation.

.4 Mounting hardware: neoprene.

2.13 INSIDE COATING FOR AIR CONDUITS

.1 General :
- .1 Fiberglass lining: coated with black colored neoprene;
- .2 The flame spread of the liner shall not be greater than 25 and its smoke index shall not exceed 50.

.2 Rigid interior lining with the following characteristics :
- .1 Suitable for use on all flat surfaces;
- .2 Fiberglass rigid panels, 25 mm thick, conforming to cgsb 51-gp-10m;
- .3 Density of at least 72 kg / m3;
- .4 Thermal resistance of at least 0.76 m² ° c / w for a 25 mm coating according to astm c177 at an average temperature of 24 ° c.

.3 Flexible inner lining with the following characteristics :
- .1 Suitable for use on round or oval surfaces only;
- .2 Fiberglass mat, 25 mm thick, conforming to cgsb 51-gp-11m;
- .3 Density of at least 24 kg / m3;
- .4 Thermal resistance of at least 0.74 m² ° c / w for a 25 mm coating according to astm c177 at an average temperature of 24 ° c.

.4 Glue in accordance with NFPA 90A and 90B:
- .1 Glue having a flame propagation index of at most 25 and a smoke index of at most 50, usable in a temperature range of -29 ° C to 93 ° C.

.5 Ducting pins, 2.0 mm in diameter, of length appropriate to coating thickness, with metal nylon retaining plates, 32 mm.

.6 Installation Locations :
- .1 in the acoustic boxes of the diffusers;
- .2 at the locations shown in the drawings.

2.14 QUIET SIL

.1 Made of 22 gauge galvanized steel.

.2 Standard Fiberglass Acoustic Equipment.

.3 Tolerance will be +/- 3.175 mm.

.4 Loss of pressure in muffler shall be maximum of 83 Pa.

.5 Must comply with ASTM E 477-06a, ASTM E84, NFPA Standar 255, IL 723 or ULC S102 standards.

.6 Tolerances shall comply with AMCA 1011-03.

.7 See location on map.

.8 See specifications in table to plan.

2.15 FLEXIBLE AIR DUCTS

.1 Provide flexible conduits between diffusers and rigid conduits and shown in the drawings.

.2 Conduits in accordance with CAN / ULC S110 standards, National Building Code requirements and NFPA 90A and 90B.

.3 Air ducts are manufactured in the factory according to CAN / ULC S-110.

.4 The pressure drop coefficients listed below are based on a reference coefficient of 1.00 for metal conduits.

.5 Flame propagation index shall not exceed 25 and smoke value shall not exceed 50.

.6 Flexible ducts: fiberglass reinforced exterior jacket with vapor barrier, with factory-applied soft fiberglass thermal insulation and fiberglass interior lining including coated, spirally wound coiled steel wire:

.1 performance :

.1 Minimum operating pressure: 2.5 kpa;

.2 Maximum relative pressure loss coefficient: 3;

.3 Insulation: 1.05 m²C / W according to ASTM C-518.

2.16 FIREWALL VCF

.1 Fire shutters shall be ULC labeled and meet the requirements of NFPA-90A. Their fire behavior shall be assessed in accordance with CAN4-S112.

.2 Factory manufactured mild steel shutters designed not to reduce the fire resistance of the wall or firewall in which it is mounted.

.3 Hinged flap mounted at top; With single eccentric, round or square flap; Of the guillotine type. The dimensions of the assembly must be calculated so as not to restrict the section of the duct in which it is mounted.

.4 Actuation by a fusible link, with counterweight allowing closing and locking in closed position when the mechanism is triggered, or with counter-closing total counter-closing control for multi-flap type or with winding mounted horizontally and vertically in a Vertical air duct.

.5 Frame of 40 x 40 x 3 mm angles throughout edge of flap, on both sides of bulkhead or firewall through.

2.17 SHUTTERS AIR DISTRIBUTORS

.1 Shutters made of the same material as the air duct, but of sheet metal of normal thickness immediately superior to that of the air duct.

.2 Flaps made of a single sheet thickness for sheaths of 450 mm width and less and two sheet thicknesses for sheaths of larger dimensions.

.3 Flaps with control rod with locking device.

.4 The curvature at the end of the stem shall prevent this end from entering the air duct.

.5 Pivot: piano type hinge.

2.18 SHAPES OF BALANCING WITH ONE SIDE

.1 Shutters made of the same material as the air duct, but made of sheet metal of normal thickness immediately superior to that of the air duct and grooved to ensure better rigidity.

.2 Flap sizes and configurations shall conform to SMACNA recommendations except for maximum height of 100 mm.

.3 Flaps with locking area indicating position and dimensions suitable for thickness of heat insulator in air duct.

.4 Flaps with tapered nylon inner and outer end bearings

.5 Frames made of profiles made of the same material as air ducts in which flaps are mounted and fitted with corner stops.

2.19 MULTIPLE SHUTTER BALANCING SHUTTERS

.1 Of the type with opposite flaps.

.2 Interlocking flaps with a maximum height of 100 mm in extruded aluminum, with extruded vinyl seals, spring-loaded stainless steel side fittings and extruded aluminum frame.

.3 Bearings made of bronze, self-lubricating, pressure-adjusted.

.4 Control linkage: plated steel tie rods, brass pivots and plated steel brackets and plated steel control rod with position indicator.

2.20 SHUTTERS FOR ANTI-DISPENSING VG

.1 Automatic shutters, gravity operated, aluminum, multi-flap, with nylon bearings, swivel type, opening mechanism with adjustable stem and counterweight attached to pallet.

2.21 PREFABRICATED CASE FOR SUPPORTS OF GRAVITY AIR INTAKE FILTERS

.1 Prefabricated filter housing with side doors (see drawing configuration) waterproof and filter rails 50 mm thick, sheet metal 16, leakage rate less than 0.5% material stainless steel, seals for doors and filters.

2.22 MOTORIZED SHUTTERS VM

.1 Shutters:
- .1 Shutters of large dimensions subdivided into sections less than 1.9 m2. Unless otherwise stated, each section will be controlled by its own engine;
- .2 Unless otherwise indicated, flaps shall be parallel blades. Install the flaps on the mixing boxes to direct the air streams against each other to ensure proper mixing;
- .3 When a mixing section is provided with the ventilation system, other flaps shall be provided near the exterior openings and on which the motors will be installed. Block the flaps of the mixing box so that the air streams are directed against each other;
- .4 Flaps shall be flanged.
- .5 Maximum leakage rate: 0.4% of maximum air volume at a differential pressure of 500 Pa. Insulation: insulated strips and frame; :
  - .1 Motorized shutters with profiled blades;
  - .2 Extruded aluminum frames and blades;
  - .3 Soft rubber gaskets up to -40 ° C;
  - .4 Maintenance-free nylon bearings;
  - .5 Maximum length of blades: 1200 mm; Maximum blade width: 140 mm;
  - .6 Teflon pads;
  - .7 Operating temperature -40 ° C to 93 ° C.
- .6 Flaps used on recirculated air and on power systems not exposed to outside temperatures will not be isolated.

PART 3. EXECUTION

3.1 GENERAL

.1 Install air ducts in accordance with SMACNA requirements and as indicated.

.2 Avoid interruption of vapor barrier of thermal insulation by installing straps or suspension rods.

.3 Secure vertical ducts in accordance with SMACNA requirements and as indicated.

.4 Use flat copper braid of size 2/0 to ensure continuity of grounding through flexible air duct connections. Fit the braids with lugs and bolt them to the ducts and to the machines.

.5 Install fire protection flaps according to the National Building Code by installing fragile joints on each side of firewalls.

.6 Identification of the sheet gauge shall appear on the exposed surface of the duct.

.7 Provide all ducts with dimensions greater than 4 to 1 of a sheet metal division in the center of the largest dimension.

.8 The longitudinal joints of the square and rectangular pipes are of the "PITTSBURGH-LOCK" type.

.9 Secure exterior ducts and goosenecks securely to the wall and roof using suitable angles.

.10 Prior to installation, all ducts shall be cleaned, degreased and ready for painting.

.11 Provide and install suitable metal brackets to support the underside of fresh air intake and evacuation plenums with access doors allowing access by an individual to the interior and locations indicated on the plans. The supports will be fixed firmly, respect the slopes of the ducts and purlins of drainage and in sufficient number to prevent any deformation. Rigid insulation will be installed between the supports and the conduit.

3.2 SUSPENSIONS

.1 Suspension straps: install suspension straps in accordance with SMACNA requirements.

.2 Suspension brackets: with lock nuts and washers.

3.3 INSTALLING LOW PRESSURE AIR DUCTS

.1 Install balancing flaps in all connections and as shown in the drawings and where required to perform testing and balancing operations.

.2 Break all flat surfaces greater than 200 mm to prevent vibration.

.3 Bolt or rivet all reinforcement angles to conduits no more than 300 mm c / c and no more than 50 mm from sides.

.4 Seal joints of low-pressure systems with sealant adhesive so that leakage rate is not greater than sealing class.

.5 Fabricate elbows to have an inside radius at least equal to duct width for ducts up to 500 mm wide. For pipes 525 mm or more in width, use square elbows with double-walled guide valves or elbows with a radius equal to one and a half times the width.

.6 Fabricate dimension and shape changes of pipes to obtain slopes of 15 ° or less.

.7 Offset pipes by means of bends with inner radius equal to pipe width.

.8 Provide twinned angle joints with closed-cell vinyl caulking such as Perma Stock type 136 M to seal airtight seals. Bolt the angles together at 150 mm c / c. Make a 10 mm crease on the ends of the ducts and fittings to make the seal. Secure the angles to the ducts by means of rivets, screws or spot welding at a maximum spacing of 300 mm.

.9 Fasten round pipe sleeve seals with screws spaced not more than 375 mm circumferentially on each side of joint with a minimum of 3 screws per joint.

3.4 WATERPROOF PIPELINES AND DRAINAGE

.1 The following ducts shall be watertight:
- .1 New air intakes and outlets;
- .2 The upstream and downstream ducts of duct-mounted humidifiers over a distance of at least 3000 mm;
- .3 As well as all ducts shown.

.2 Form bottom of horizontal ducts without longitudinal joints. Braze or weld the transverse joints of the bottom and side plates. Seal all other joints with air sealant.

.3 Provide sufficient downward slope to ductwork to allow outflow of water through the louvers to which they are connected (fresh air intakes and exhaust ducts). Seal the entire assembly (including louvers).

.4 Place drip tray 150 mm deep, with 32 mm drainage connection, as shown on drawing, bottom of duct sections. (Connection of the drain connection to a deep water guard siphon and connected to a funnel drain by a plumbing contractor).

3.5 SEALING

.1 Apply sealants to outer face of seals as recommended by manufacturer.

.2 Tape the tape into the sealant and cover with at least 1 coat of the same product as recommended by the manufacturer.

3.6 NEW AIR INTAKE AND EXHAUST AIR OUTLETS

.1 Install outlets and outlets according to SMACNA details.

.2 Reinforce and brace air outlets and outlets to resist wind thrusts in accordance with National Building Code requirements and wind speed data for a particular area.

.3 Fit screws, screwed aviary grilles, 1.6 mm thick aluminum wire with 25 mm mesh, and air outlet vents, screwed avian screens, In aluminum wire of 1.6 mm thickness, with mesh of 12 mm.

3.7 HOLES FOR MEASURING AND TESTING INSTRUMENTS

.1 Place 25 mm plugs with a chain and cap in the required places to seal the test and balancing holes.

3.8 INSTALLING FLEXIBLE AIR DUCTS

.1 Install flexible air ducts at designated locations and in accordance with SMACNA recommendations.

.2 Flexible air ducts shall be supported in accordance with SMACNA recommendations at 1.2 m center distance.

.3 Flexible air ducts shall not be more than 2 m in length.

.4 Secure flexible air ducts to ducts and grids or diffusers with adjustable stainless steel collars.

.5 Using duct tape, seal the connections between the flexible air ducts and the terminal elements.

3.9 ACCESSORIES FOR AIR DUCTS

.1 Flexible Fittings :
- .1 To be installed at the following locations :
  - .1 The inlets and outlets of blowers;
  - .2 The inlets and outlets of exhaust and exhaust fans;
  - .3 At specified locations.
- .2 Length of flexible couplings: 100 mm;
- .3 Minimum distance between metallic elements when the system is in operation: 75 mm;
- .4 Install in accordance with SMACNA recommendations;
- .5 When the fan is operating :
  - .1 The metallic elements at each end of the flexible sleeve must be properly aligned;
  - .2 The cuff must have a clear.

.2 Duct access doors :
- .1 Location :
  - .1 Where required to allow access to smoke flaps and fire dampers;
  - .2 Where required to allow access to flaps;
  - .3 Where required to allow access to devices requiring periodic maintenance;
  - .4 Where required to permit balancing;
  - .5 Where required, as required by the code;
  - .6 Locations required for access to reheating batteries;
  - .7 At specified locations.

.3 Fittings for Receiving Test Instruments:
- .1 General :
  - .1 Install fittings in accordance with SMACNA recommendations and manufacturer's instructions.
- .2 Location :
  - .1 Measurement of air flow :
    1. The admission of wall or roof-mounted exhaust fans;
    2. The admission and return of the other fans;
    3. On the main ducts and main branches;
    4. Where indicated.
  - .2 Measurement of temperature :
    5. On outdoor air intakes;
    6. On the air mixing boxes, as approved by the ministry representative;
    7. The inlet and outlet of coil batteries;
    8. Upstream of any meeting point between two converging air veins of different temperatures;
    9. Where indicated

.4 Déflectors :
.1 Install in accordance with SMACNA recommendations and as indicated.

3.10 SOUNDPROOFING

.1 The dimensions shown in the drawings are in fact the internal dimensions of the duct, once the internal lining is in place.

.2 Install interior lining as recommended by manufacturer and as follows :
.1 Fix the lining by means of a glue applied over the entire metal surface to be lined;
.2 In addition to glue, install at least two rows of dowels on each surface to be fitted, up to a maximum of 425 mm center distance.

.3 Seal with joint tape and sealant the exposed edges and joints of the lining, voids around the anchors and all damaged lining parts. Install the seal tape as recommended by the manufacturer and in the following manner :
.1 Embedding the seal tape in the sealant;
.2 Apply two coats of sealant to ribbon.

.4 Parts of lining that are severely damaged should be replaced at the discretion of the Minsitere representative.

.5 Install 15 mm overlapping sheet metal and attached to conduit on end and / or upstream and downstream ends of the liner.

3.11 SHUTTERS

.1 Install flaps in designated locations.

.2 Install flaps in accordance with SMACNA recommendations and manufacturer's instructions.

.3 In balancing, return and extraction systems, balancing flaps shall be located in each bypass duct. They should be placed as close as possible to the main duct. Refer to drawings for flaps to be positioned in traffic and access corridors. No flap shall be placed over any equipment, furnishings or other obstructions.

.4 When turning on the system, make sure that the flaps are working properly. Refer also to section 23 09 23 "Control and regulation".

.5 Install flaps to prevent vibration.

3.12 FIRE SHUTTERS

.1 Install the equipment in accordance with the requirements of NFPA 90A and ULC approval conditions.

.2 Carry out work without degrading the fire resistance of the firewalls in which the equipment is mounted.

.3 Where appropriate, have the competent authority approve all work done before concealing parts.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 23 05 01 :Use of HVAC systems – General requirements.

.2 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment.

.3 Section 23 33 01 : Air distribution ducts and accessorie.

.4 Division 26 : Electricity.

1.2 REFERENCES

.1 AMCA (Air Moving and Conditioning Association) :
- .1 AMCA 300 : Reverberant Room Method for Sound Testing of Fans;
- .2 AMCA 301 : Methods for Calculating Fan Sound Ratings from Laboratory Test;
- .3 AMCA 210 : Laboratory Methods of Testing Fans for Aerodynamic Performance Rating;
- .4 AMCA 99 : Standards Handbook;
- .5 AMCA 210 : Laboratory Methods of Testing Fans for Rating.

.2 ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) :
- .1 ASHRAE 51 : Laboratory Methods of Testing Fans for Rating.

.3 AFBMA (The Anti Friction Bearing Manufacturers) :
- .1 AFBMA 9, L10 et 11.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT (FREQUENCY)	REGISTRATION	RESPONSABILITY
	BP	Workshop drawings in accordance with Section 23 05 01.	Prior to delivery, as required for submission of shop drawings or execution of bid solicitation.	Letters of transmission. Recording of the shop drawings.	Contractor
1.4	MP	Seismic qualification certifications from the manufacturer.	Accompany the shop drawings of the devices in question.	Certification of seismic qualification.	Contractor
1.5	BP	Performance testing.	Before the delivery.	Test report	Contractor
	MP	Certificate of conformity in accordance with Section 23 05 01.	At delivery.	Attestation of conformity.	Contractor
1.6	BP	Inspections of fans.	At each reception.	Inspection report	Contractor
1.7	BP	Inspections of work.	According to the determined frequency.	Inspection report	Contractor

BP :BREAKPOINT **MP** : MONITORING POINT

1.4 PERFORMANCES

.1 Perform fan performance tests and submit results prior to delivery confirming compliance with shop drawings.

1.5 INSPECTION ON DELIVERY

.1 Inspect the fans when they are delivered to the site and submit the inspection reports in accordance with the requirements of 23 05 01 - Use of HVAC systems – General requirements.

1.6 INSPECTION OF WORK

.1 Inspect the fan installation at the end of the work. At each inspection, submit an inspection report including, but not limited to, the following information:
- .1 The scope of the audited work;
- .2 Fixation;
- .3 Base of cleanliness
- .4 la vérification de l'installation des ventilateurs en conformité avec les recommandations du manufacturier;

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCTS

2.1 FAN - GENERAL

.1 Characteristics of the apparatus: flow rate, static and total pressure, rotational speed in revolutions per minute, mechanical power (BHP), useful power (W), efficiency, dimensions, model, sound intensity, class and others.

.2 Nominal sound intensity rating: AMCA 301 compliant. Tests: AMCA 300 compliant. The fan must be labeled with the AMCA to confirm the loudness.

.3 Fans: balanced statically and dynamically, and constructed in accordance with the requirements of AMCA 99.

.4 Nominal performance of equipment: based on tests performed in accordance with AMCA 210 and ASHRAE 51. With the exception of fans with propellers less than 300 mm in diameter, all devices shall bear the approval the AMCA.

.5 Bearings: heavy duty, grease lubricated, ball-type or ball-bearing ball bearings, sealed and dust and oil-tight, having a certified service life of at least 200,000 h , in accordance with the AFBMA L10 standard. The nominal characteristics of the bearings shall be selected in accordance with AFBMA 9 and AFBMA 11.

.6 Engines: For connection to speed or ECM type control devices as appropriate.

.7 Motors: power according to specifications.

.8 Accessories and other parts: adjustable sliding motor bases, protective guards, coupling housings, safety grilles at the discharge suction inlets, flaps at discharge and others, as indicated.

.9 Apparatus coated in the factory, before assembly of the parts, with a primer coat of color chosen from the standard range offered by the manufacturer.

.10 Evacuation points on volute as indicated.

.11 Bearing lubrication systems with extension tubes for lubrication, where the bearings are not readily accessible.

.12 Vibration isolation: complies with the requirements of section 23 05 48 " Vibration and seismic controls for HVAC piping and equipment.".

.13 Flexible connecting sleeves: in accordance with the requirements of 23 33 01 "Air distribution ducts and accessories".

.14 The manufacturer must be able to confirm the sound power levels generated for each fan, in each octave band, both at the inlet and at the fan outlet.

.15 The fans must have been balanced statically and dynamically at the manufacturer's factory before shipping.

2.2 CENTRIFUGAL FANS IN HOUSING SUPPLY VA1 ET VA2

.1 In-line fan in a square box.

.2 Frame :
- .1 Galvanized steel construction
- .2 Bolted access doors on 3 sides with neoprene sealing tape

.3 Fan wheels :
- .1 Welded aluminum construction;
- .2 The maximum speed of the centrifugal fans shall not exceed 40 per cent of the initial critical speed;
- .3 the wheels shall be fitted with aerodynamic vanes, inclined towards the rear, inclined towards the front, as indicated.
- .4 Aluminum aerodynamic suction cone

.4 Caisings :
- .1 Casings made of steel or aluminum, with inlet cones, for wheels up to 300 mm in diameter and steel or aluminum for smaller wheels with spacers and brackets;
- .2 Horizontal and vertical joint casings, with flanges on each side for bolting, and watertight seals made of stainless and non-flammable material;
- .3 Bolted, latch or airtight hinged access doors, with handles.

.5 Ball or roller bearings, ball bearings, grease lubricated for heavy duty, diamond-plated type seal, dust seals and oil retention seals, with a certified service life of at least 200 000 hours. Controlled by a variable speed drive.

.6 With ECM motor with connection terminal block for external signal low voltage (0-10V) or controlled by a variable speed drive as appropriate.

.7 The fans will be supplied with insulation spring for suspension rod. The insulation springs will be guided and will have a rubber at the base.

.8 Refer to the fan board chart.

2.3 WALL EXHAUST FAN VE3-1, VE3-2 ET VE3-3

.1 Directly driven centrifugal fan assemblies :
- .1 Envelopes: made of powder-coated aluminum covered with a layer of stainless steel enamel; Each assembly must comprise a motor and a fan mounted on a rigid support;
- .2 ECM motor with connection terminal block for low voltage external signal (0-10V)
- .3 wheel: aluminum, with inclined blades to the rear;
- .4 avian aluminum wire of 2.0 mm diameter, 12 mm mesh
- .5 seals installed continuously on mounting frame,
- .6 Bolts and screws in stainless steel
- .7 Hinged mounting frame allowing access to internal components for maintenance.

.2 Refer to fan board chart on plan.

2.4 ROOF TYPE EXHAUST FANS VE1 ET VE2

.1 Directly driven centrifugal fan assemblies:
- .1 Envelopes: made of powder-coated aluminum covered with a layer of stainless steel enamel; Each assembly must have a motor and a fan mounted on a rigid support;
- .2 ECM motor with connection terminal block for low voltage external signal (0-10V)
- .3 Wheel: aluminum, with inclined blades to the rear;
- .4 avian aluminum wire of 2.0 mm diameter, 12 mm mesh
- .5 seals installed continuously on mounting frame,
- .6 Bolts and screws in stainless steel
- .7 Hinged mounting frame allowing access to internal components for maintenance.

.2 Refer to fan board chart on plan.

PART 3 - EXECUTION

3.1 FANS INSTALLATION

.1 Install the fans as shown in the drawings, the requirements of this section and in accordance with the manufacturers' instructions.

.2 Flexible connecting sleeves prescribed in 23 33 01 "Air distribution ducts and accessories" must be installed at the inlet and outlet of the fans. Make sure the metal clamps of the fittings are parallel and have a minimum flexibility of 25 mm between the duct and the fan when the fan is in operation.

.3 Install shock absorbers as specified in drawings or specifications. Flexible connection sleeves must not be in tension when the fan is running.

.4 Bearings and extension tubes of the lubrication system shall be easily accessible.

.5 Doors and access panels shall be readily accessible. Lubrication points should be easily accessible (at the bottom of the hanging appliances). Provide additional piping sections.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal procedures

.2 Section 01 78 00 – Closeout submittals

.3 Section 01 74 11 – Cleaning

1.2 REFERENCES

.1 American Conference of Governmental Industrial Hygienists (ACGIH)

.1 ACGIH 2095, Industrial Ventilation: A Manual of Recommended Practice for Design, last Edition.

.2 National Fire Protection Association (NFPA)

.1 ANSI/NFPA 91 last edition, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids.

.3 ASTM International Inc.

.1 ASTM C700 last edition, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for inlets, hoses, ducts, and fans, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.

.2 Indicate following:

.1 Fan performance curves.

.2 Inlet details.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit list of manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.6 QUALITY ASSURANCE

.1 Certifications:

.1 Provide catalogued or published ratings obtained from tests carried out by manufacturer or ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

PART 2 PRODUCTS

2.1 INLETS

.1 As shown in the drawings

2.2 HOSES

.1 EMPTY.

2.3 DUCTS

.1 EMPTY.

2.4 FANS

.1 As shown in the drawings

PART 3 EXECUTION

3.1 APPLICATION

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

3.2 INSTALLATION

.1 Install in accordance with NFPA 91, and to manufacturers instructions.

.2 Follow ACGIH industrial ventilation details, print VS-907 and VS-908.

.3 Slope ducting to low point.

.4 Install pump out sump on underground ducts at low point.

.5 Install drain from low point in overhead ducts to floor drain.

.6 Make joints watertight and airtight when subjected to 1.5 kPa pressure.

.7 Install duct supports to manufacturer's recommendations.

3.3 TESTING

.1 Test assembled and sealed ductwork from fan inlet to suction inlets under 2.5 kPa pressure for 30 minutes.

.1 Leakage not to exceed 1% of design total air flow.

.2 Test apparatus to include calibrated orifice and manometer.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse, recycling.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 23 05 01 : Common work results for HVAC.

.2 Section 23 05 48 : Vibration and seismic controls for hvac piping and equipment.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB):
- .1 CGSB 1-GP-81M : Painting with zinc chromate and iron oxide;
- .2 CGSB 1-GP-12c : Paint standard colors;
- .3 CGSB 1-GP-88M : Enamel paint with alkyd resins.

.2 National Fire Protection Association (NFPA) :
- .1 NFPA 90A : Installation of air conditioning and ventilating systems.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	PRESCRIPTIONS	MOMENT	RECORDS	RESPONSABILITY
	BP	Shop drawings in accordance with Section 23 05 01.	Prior to delivery, according to the requirements for submission of shop drawings or execution of the call for tenders.	Letters of transmission. Recording of the shop drawings.	Contractor
1.5	BP	Certificate of	Delivery	Certificates of attestation of	Contractor
	BP	Attestation of conformity in accordance with section 23 05 01.	Delivery	Documents of attestation of conformity.	Contractor
1.6	BP	Inspection of grilles and diffusers	At each reception.	Inspection reports.	Contractor
1.7	BP	Inspection of installation work.	According to the determined	Inspection reports.	Contractor

BP : BREAKPOINT **MP** : MONITORING POINT

1.4 PREFABRICATED ELEMENTS

.1 For a given type, grilles and diffusers of the same generic type must come from the same manufacturer.

1.5 CERTIFICATION OF PERFORMANCE

.1 The characteristics given in our catalogs and manufacturer documentation with respect to prefabricated elements will be those established during tests made by it or on its behalf by an independent laboratory, attesting the compliance of items with codes and standards.

1.6 INSPECTION ON DELIVERY

.1 Inspect grilles and diffusers when they are delivered to the site and submit inspection reports.

1.7 INSPECTION OF WORKS

.1 Inspect grilles and diffusers at the end of the work. At each inspection, submit an inspection report.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Products that meet the requirements for flow, spray range, noise level and speeds at the maximum shrinkage point and outlet.

.2 Steel clamps, at least 1.2 mm thick, attached to each ceiling diffuser, shutter and grille; These collars, which must extend to the shutter or shutter, will allow the elements to be suspended from the structure of the building without being made integral with the membrane traversed, in order to maintain the degree of fire resistance of the membrane.

.3 Firewall crossings for grilles and diffusers shall be fitted with steel sleeves secured to the framing in accordance with NFPA 90A.

.4 Frame :
- .1 Extruded aluminum frame with satin finish with mechanical fasteners and miter gaskets at corners;
- .2 inserts on all edges;
- .3 Plaster frames to retain all frames in place when installed in a wall or wall of plaster or gypsum board;
- .4 Concealed fixing and operating devices.

2.2 CHARACTERISTICS

.1 Refer to chart on plans.

.2 Dimensions are shown on the execution drawings in nominal values.

2.3 FINISH

.1 Primer: in accordance with CGSB 1-GP-81M, CGSB 1-GP-12c.

.2 Enamel: in accordance with CGSB 1-GP-88M, CGSB 1-GP-12c; At the option of the Departmental Representative.

2.4 FEED AND RETURN GRILLES

.1 Characteristics: as indicated on plans.

.2 Location: as indicated on plans.

2.5 AIR INLET AND EXHAUST - EXPANDED METAL

.1 Characteristics: as indicated on plans.

.2 Location: as indicated on plans.

PART 3 - PARTIE 3 - EXÉCUTION

3.1 INSTALLATION

.1 Install the grilles and diffusers according to the manufacturer's instructions.

.2 If fasteners are visible, use flat head screws embedded in countersunk holes.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal procedures

.2 Section 01 35 29.06 – Health and safety requirements

.3 Section 01 74 11 – Cleaning

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/ National Fire Protection Association (NFPA)

.1 ANSI/NFPA 96 last edition, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM E90 last edition, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.5 Society of Automotive Engineers (SAE)

1.3 SYSTEM DESCRIPTION

.1 Performance requirements

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate following:

.1 Pressure drop.

.2 Face area.

.3 Free area.

.2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

.3 Test Reports

.1 Submit certified data from independent laboratory substantiating acoustic and aerodynamic performance to ASTM E90.

1.5 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

PART 2. PRODUCT

2.1 GRAVITY ROOF OUTSIDE AIR INTAKES AND RELIEF VENTS

.1 Factory manufactured aluminum

.1 Complete with integral birdscreen of 2 mm

.2 Horizontal backdraft dampers.

.3 Maximum throat velocity: 2.8 m/s

.4 Maximum loss through unit: 15 Pa exhaust static pressure.

.5 Maximum velocity through damper area: 1.5 m/s.

.6 Shape: as indicated.

.2 Birdscreens :

.1 Complete with integral birdscreen of 2.7 mm diameter aluminum wire. Use 12 mm mesh on exhaust 19 mm mesh on intake.

2.2 GOOSENECK HOODS

.1 Thickness: to SMACNA.

.1 Kitchen: to ANSI/NFPA 96.

.2 Elsewhere: to SMACNA.

.2 Fabrication: to SMACNA.

.1 Kitchen: to ANSI/NFPA 96.

.2 Elsewhere: to SMACNA.

.3 Joints: to SMACNA proprietary manufactured duct joint. Proprietary manufactured flanged duct joint considered class A seal.

.4 Supports: as indicated.

.5 Complete with integral birdscreen of 2.7 mm diameter aluminum wire. Use 12 mm mesh on exhaust 19 mm mesh on intake.

.6 Vertical or Horizontal backdraft dampers on two faces.

2.3 FIXED LOUVRES - ALUMINUM

.1 Construction: welded with exposed joints ground flush and smooth.

.2 Material: extruded aluminum alloy 6063-T5.

.3 Blade: stormproof pattern with centre watershed in blade, reinforcing bosses and maximum blade length of 1500 mm.

.4 Frame, head, sill and jamb: 150 mm deep one piece extruded aluminum, minimum 3 mm thick.

.5 Mullions: at 1500 mm maximum centres.

.6 Fastenings: stainless steel SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, ss washer and aluminum body.

.7 Screen: 12 mm exhaust 19 mm intake mesh, 2 mm diameter wire aluminum birdscreen on inside face of louvres in formed U-frame.

.8 Finish: factory applied enamel. Colour: to Departmental Representative approval.

2.4 FIEXED LOUVRES

.1 EMPTY

2.5 ADJUSTABLE LOUVRES

.1 EMPTY

PART 3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 In accordance with manufacturer's and SMACNA recommendations.

.2 Reinforce and brace as indicated.

.3 Anchor securely into opening. Seal with caulking to ensure weather tightness.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1. GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 23 05 01 : Use of HVAC systems during construction.

.2 Section 23 05 48 : Vibration and seismic controls for HVAC piping and equipment.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) :
- .1 ASHRAE 52, Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

.2 Underwriter's Laboratories of Canada (ULC) :
- .1 ULC-S111, Fire Tests for Air Filter Units.

.3 Canadian General Standards Board (CGSB) :
- .1 CAN/CGSB-115.10 Disposable Air Filters for the Removal of Particulate Matter from Ventilating Systems;
- .2 CAN/CGSB-115.11, Filters, Air, High Efficiency, Disposable, Bag Type;
- .3 CAN/CGSB-115.12, Filters, Air, Medium Efficiency, Disposable, Bag Type.; CAN/CGSB-115.14 High Efficiency Cartridge Type Supported Air Filters for the Removal of Particulate Matter from Ventilating Systems;
- .4 CAN/CGSB-115.15 High Efficiency Rigid Type Air Filters for Removal of Particulate Matter from Ventilating Systems;
- .5 CAN/CGSB-115.16 Activated Carbon for Odor Removal from Ventilating Systems;
- .6 CAN/CGSB-115.18 Filter, Air, Extended Area Panel Type, Medium Efficiency.

.4 International Organization for Standardization (ISO)
- .1 ISO 14644-1, Cleanrooms and associated controlled environments – Part 1 : Classification of air cleanliness by particle concentration.

1.3 QUALITY MANAGEMENT

.1 Carry out the following activities and submit the requested documents :

QUALITY MANAGEMENT TABLE

ART.	BP/MP	REQUIREMENTS	MOMENT (FREQUENCY)	REGISTRATION	RESPONSABILITY
	BP	Workshop drawings in accordance with section 23 05 01.	Before the delivery, according to the requirements for submission of shop drawings or execution of	Letters of transmission. Recording of the shop drawings.	Contractor
1.4	BP	Tests of the degree of saturation of the filters.	Before the delivery	Test reports	Contractors
	BP	Attestation of conformity in accordance with section 23 05 01.	At the delivery.	Documents of attestation of conformity.	Contractors
1.5	BP	Inspection of filters	At each reception	Inspection reports	Contractors
1.6	BP	Inspection of works	According to the determined frequency.	Inspection reports	Contractors

BP : BREAKPOINT M **P** : MONITORING POINT

1.4 TESTS

.1 Submit a laboratory test report of the degree of saturation for each type of filters provided.

1.5 DELIVERY INSPECTION

.1 Inspect the filters when they are delivered to the site and submit the inspection reports.

1.6 WORK INSPECTION

.1 Inspect the filter installation at the end of the work. At each inspection, submit an inspection report including, but not limited to, the following information :
- .1 the scope of the audited work;
- .2 checking installation of filters in accordance with manufacturer's recommendations.

1.7 MANAGEMENT AND ELIMINATION OF RESIDUAL MATERIAL

.1 Dispose of residual materials and packaging materials of any kind with methods established according to the type of waste treatment defined in accordance with the environmental section of the specific clauses.

PART 2. PRODUCTS

2.1 FILTERS DESCRIPTION

.1 Use incombustible materials in the manufacture of the filter battery.

.2 Efficacy: as ASHRAE 52 Section 3-16, for the determination of the amount of airborne dust.

.3 Standard dust retention capacity ASHRAE 52.

.4 Frames :
- .1 Frames and prefabricated supports made of galvanized steel for the filters with gaskets between the frames and the walls to ensure a waterproofing. Assembly frames: constructed with profiles.

.5 Filters : suitable for air at 100% RH and air temperatures between minus 40 and 50 °C.

.6 Filters and brackets must come from the same manufacturer.

2.2 CARTRIDGE FILTERS, 30 TO 35% EFFICIENCY - MERV 8

.1 Filter element: Pre-molded synthetic microfibres disposable under a synthetic cartridge.

.2 Frame of the filter element: rigid board with spacers.

.3 Filter element support: welded wire mesh.

.4 Efficiency: 30 to 35%, as ASHRAE 52.2

.5 Fire resistance : as ULC-S111.

.6 Thickness 50 mm.

.7 Final strength 250 Pa.

PART 3. EXECUTION

3.1 INSTALLATION - GENERAL

.1 Install in accordance with manufacturer's recommendations.

.2 Use the components and accessories recommended by the manufacturer to ensure the integrity of the installation and so that maintenance personnel, even when wearing safety clothing, can remove and replace them without difficulty.

.3 Before receiving the work, perform tests to verify the integrity of the installation.

3.2 REMPLACEMENT FILTER MEDIA

.1 Filter media to be new and clean, as indicated by pressure gauge, at time of acceptance.

3.3 REPLACEMENT FILTER ELEMENTS

.1 Provide alternative filter elements as required.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal procedures

.2 Section 01 35 29.06 – Health and safety requirements

.3 Section 01 74 11 – Cleaning

.4 Section 01 78 00 – Closeout submittal

.5 Division 26 – Electricity

1.2 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

.2 Underwriters' Laboratories of Canada (ULC)

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.

.2 Indicate following:

.1 Methods of sealing sections.

.2 Methods of expansion.

.3 Details of thimbles.

.4 Bases/Foundations.

.5 Supports.

.6 Guy details.

.7 Rain caps.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Closeout Submittals

.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements: work to be performed in compliance with applicable Provincial regulations.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Certificates:

.1 Catalogued or published ratings: obtained from tests carried out by independent testing agency or manufacturer signifying adherence to codes and standards.

PART 2 PRODUCTS

2.1 FUELS: PRESSURE CHIMNEY AND BREECHING

.1 ULC labelled, 760 degrees C rated.

.2 Sectional, prefabricated, double wall with mineral wool insulation with mated fittings and couplings.

.1 Liner: thick, type 304 or 316 stainless steel.

.2 Shell: stainless steel.

2.2 ACCESSORIES

.1 Cleanouts: bolted, gasketted type, full size of breeching, as indicated.

.2 Barometric dampers: double acting, 70% of full size of breeching area.

.3 Hangers and supports: in accordance with recommendations of Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) and as indicated.

.4 Rain cap.

.5 Expansion sleeves with heat resistant caulking, held in place as indicated.

.6 Silencer supplied with generator (see division 26)

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION - GENERAL

.1 Follow manufacturer's and SMACNA installation recommendations for shop fabricated components.

.2 Suspend breeching at 1.5 m centres and at each joint.

.3 Support chimneys at bottom, roof and intermediate levels as indicated.

.4 Install thimbles where penetrating roof, floor, ceiling and where breeching enters masonry chimney. Pack annular space with heat resistant caulking.

.5 Install flashings on chimneys penetrating roofs, as indicated.

.6 Install rain caps and cleanouts, as indicated.

3.3 INSTALLATION - REFRACTORY LINED STEEL CHIMNEY

.1 Seal insulating refractory at top of stack.

.2 Pack annular space around breeching at entry tee with heat resistant caulking.

.3 On completion, paint one coat of rust inhibitive primer and two coats of heat resisting paint of colour, make and quality approved by Departmental Representative.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal procedures

.2 Section 01 35 29.06 – Health and safety requirements

.3 Division 26 - Electricity

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA B140.11 – M89 (R2014).

.2 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

.2 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit product data and include:

.1 Element support details.

.2 The total rated power in kW of the heat exchanger of the heating coil.

.3 Rating of stage: rating, voltage, phase, of the power supply

.4 Heater element watt/density and maximum sheath temperature.

.5 Maximum discharge temperature.

.6 Physical size.

.7 Unit support.

.8 Performance limitations.

.9 Clearance from combustible materials.

.10 Internal components wiring diagrams.

.11 Minimum operating airflow.

.12 Pressure drop operating airflow.

1.4 QUALITY ASSURANCE

.1 Health and Safety.

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

PART 2 PRODUCTS

2.1 DUCT HEATERS (CC-1 and CC-2)

.1 Duct heaters: flange type.

.2 Elements:

.1 Header tank heat exchanger and tubes in stainless steel quality 316

.3 One-stage forced-draft type burner

.4 Controls:

.1 Factory mounted and wired in control box. Use terminal blocks for power and control wiring to thermostat and sail switch.

.2 Remote mounted as indicated with terminal strips in heater terminal box for power and control wiring.

.3 Controls mounted in heater, exercise care in mounting contactors to minimize switching noise transmission through ductwork.

.5 Electrical:

.1 Characteristics of the power supply of the heating batteries:

.1 240 voltage.

.2 1 phase.

.6 Main isolation disconnect switch.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Make power and control connections to CSA B140.11 – M89 (R2014).

END OF SECTION

1. PART- GENERAL

1.1 GENERAL

.1 This section contains requirements common to the various electrical sections and serves to complement the requirements of other divisions.

.2 Specifications and plans for mechanical, structural, architectural, civil and municipal engineering shall form an integral part of the electricity specifications as if they were reproduced at length.

.3 The Contractor shall familiarize himself with the type of construction proposed by carefully examining the plans and specifications accompanying the contract documents.

.4 During construction, the contractor must ensure that the most recent revisions are in his possession. Only plans issued for construction must be considered.

.5 No additional remuneration will be granted for unscheduled work, but required by the type of construction.

1.2 SUMMARY

.1 General Requirements for Results of Work Under Divisions 26 and 28.

.2 Sustainability Requirements for Construction and Control.

1.3 CODES AND STANDARDS

.1 The following codes or regulations must be respected to the letter

- .1 The National Building Code, last edition;
- .2 Municipal and provincial by-laws relating to:
  - .1 the inspection of the vessel;
  - .2 Canadian Electrical Code and Quebec Amendments, last edition.
- .3 However, if the plans and specifications are more demanding than the codes, the Contractor must follow the plans and specifications.

1.4 WORKS BY THE GENERAL CONTRACTOR

.1 All openings for ducts in walls, floors and ceilings 150 mm in diameter and over are the responsibility of the General Contractor. On the other hand, the Contractor-Electrician must indicate to the General Contractor, prior to the commencement of the work, the location of the drilling required by the electrical works in order to allow the installation of sleeves.

.2 Excavation work, backfilling, concrete bases, transformer base, concrete block, access wells, etc.

.3 Masonry, gypsum, concrete, plasterboard and paint work required following demolition and redevelopment.

1.5 NOMINAL TENSIONS

.1 Operating voltages shall comply with CAN3-C235.

.2 All electric motors, heaters, control and distribution devices shall operate satisfactorily at a frequency of 60 Hz and within the limits specified in the above-mentioned standard. The equipment must be capable of operating under the extreme conditions defined in this standard without damage.

1.6 NATURE OF PLANS

.1 The departmental representative reserves the right to interpret all the contents of the plans and specifications prepared by him. The Contractor must obtain all necessary clarification during the tenders. The Contractor must submit to the Departmental Representative any anomalies on the plans before commencing this part of the work.

.2 Plans and specifications, schedules, labor regulations, departmental representative documents, general and specific terms and conditions and other bid documents form an integral part of this section and govern the works.

.3 Electricity plans are intended for persons qualified in their respective fields. They are in part in the form of diagrams designed to show the general arrangement and extent of the work. The exact location of ducts, exits and equipment is dictated by site conditions. So you do not have to use a ladder to read the plans.

.4 Contractors must follow these plans for the installation of their equipment and must also consult the general plans and plans of the other trades, in order to familiarize themselves with all the conditions and to verify the space required for their work.

.5 Any item required for the proper performance of the work that has been omitted from the contract, but clearly understood to be necessary, is provided as part of this contract.

.6 The location of electrical appliances is subject to change prior to installation at no additional charge to the Departmental Representative if the distance is 3 m or less.

.7 Contractors must verify all plans and specifications during the bidding period and notify the Departmental representative of any discrepancies between them.

1.7 RIGHTS, PERMITS AND INSPECTION

.1 Submit appropriate number of copies of drawings and specifications to the Electrical Inspection Service and the electricity supply organization concerned for study and approval prior to commencement of work.

.2 Pay all related costs.

.3 Drawings and specifications required by the Electrical Inspection Service and Electricity Supply Agency shall be provided free of charge by the Departmental Representative.

.4 Inform departmental representative of changes required by Electrical Inspection Service before making any changes to drawings or specifications.

1.8 MATERIALS AND EQUIPMENT

.1 Otherwise, use new materials and equipment.

.2 Materials and equipment must be certified by a recognized Canadian organization. Where there is no alternative but to provide equipment not approved by a recognized Canadian organization, obtain prior approval from the Electrical Inspection Service.

.3 Control panels and components must be assembled at the factory.

.4 Unless otherwise specified, use products of a single manufacturer in the case of materials and equipment of the same type or class.

.5 In special areas, use appropriate products. For example, in damp, dusty locations, etc., the material must be approved for location.

1.9 MATÉRIAL AND INSTALLATION

.1 Ensure that each unit can be assembled and dismantled with minimal displacement.

.2 Consistency

Unless otherwise stated, equipment and materials of the same classification with the same function come from the same manufacturer.

.3 Design

The equipment and its accessories are manufactured according to applicable codes or other standards and must have clean and finished surfaces.

.4 Installation

The equipment is installed according to the rules of the art: at level and along the horizontal and vertical axes. The connections are easily accessible for maintenance and repairs. For all pieces of equipment requiring the coordination of several trades, the Contractor must provide the exact dimensions and location in good time so as not to harm the other Contractors.

.5 .Cooperation

Each Contractor shall cooperate with the other Contractors in a full and complete manner so as to facilitate the work of the other Contractors.

.6 Noise and Vibration

The equipment operates silently or vibrating to the satisfaction of the Departmental Representative. Any noise or vibration resulting from improper installation is corrected at no additional cost.

.7 Equipment Protection

The maintenance and protection of the relocated equipment or equipment provided by the Contractor is the responsibility of the Contractor until the work is accepted. The equipment is protected against all causes, such as theft, abuse of use, vandalism, etc.

.8 Coordination and time schedule

The time schedule is established by the General Contractor. The Contractor coordinates the delivery of equipment and manpower to meet the time schedule. The Contractor shall proceed in such a manner as to cause no delay and not to interfere with the other trades.

1.10 ELECTRIC MOTORS, APPLIANCES AND CONTROLS

.1 Control wiring and related conduits will be provided under Division 26, with the exception of ducts, wiring and connections operating at or below 50 V and related to the control systems prescribed in Division 23 and shown on the drawings of the mechanical installations.

1.11 FINITION

.1 Finish the metal envelope surfaces in the workshop, ie apply an anti-rust primer, both indoors and outdoors and at least two coats of finish enamel paint.

.1 Painting light-gray indoor switchgear and distribution cabinets in accordance with AMEEC 2Y.

.2 Clean and repair shop-painted surfaces that have been scratched or damaged during shipping and installation; Use a painting that harmonizes with the original painting.

.3 Clean and prepare hooks, brackets, fasteners and other visible, non-galvanized fasteners to protect them from rust.

1.12 SHOP DRAWINGS

.1 Prior to ordering, the Contractor shall provide shop drawings of all equipment that it proposes to provide and install. It should clearly identify the selected equipment on the shop drawings. Drawings must be provided in electronic PDF format for verification by the Departmental Representative.

.2 Verification of shop drawings only indicates that the overall quality and "design" of the equipment is acceptable. Verification of the dimensions, quantities or location of equipment connections remains the responsibility of the Contractor.

.3 The Departmental Representative shall have ten (10) working days for the verification of the shop drawings from the day of receipt of the documents at his office.

.4 No shop drawings shall be considered if not clearly identified and not submitted in accordance with 1.16.5.

.5 Workshop drawings contain the following information:

.1 Masterplans showing component parts;

.2 Total dimension, required dimension for installation, mounting detail;

.3 Full description of device performance such as voltage, amperage, performance curve, device limit, weight, electrical characteristics and diagrams, etc. ;

.4 Caliber and finish of metals;

.5 Sound level and other calibration curve.

.6 Contractor must obtain and follow manufacturer's installation instructions.

1.13 CORRECTED DRAWINGS

.1 Documents to be kept on site

.1 Use a set of drawings and indicate, as they occur, any changes made during the course of the work. These indications must include the changes made.

.1 Show duct location, junction boxes and wiring.

.2 Indicate all changes in the diameter of the ducts and the number of single-wire conductors inserted therein.

.3 Keep these drawings on site and make them available for reference and verification purposes.

.2 Execution drawings

.1 Provide three (3) copies of drawings as constructed. Identify each design in the lower right corner, in letters at least 12 mm high, as follows: "DRAWINGS AFTER PERFORMANCE: THIS DRAWING HAS BEEN REVISED AND SHOWS THE ELECTRICAL SYSTEMS AND APPARATUS SUCH AS THEY WERE INSTALLED ". (Signature of Contractor) (date).

.2 Drawings conforming to the execution of the work are placed in pockets as an appendix to the maintenance and operation manuals

1.14 WIRE TERMINATIONS

.1 Terminals, terminals and screws for wire connection shall be suitable for copper and / or aluminum conductors.

1.15 LABELS OF MANUFACTURERS AND CSA

.1 Once the equipment is installed, the labels of the manufacturers and the CSA must be clearly visible and legible.

1.16 WARNING SCREENS

.1 The warning signs shall conform to the requirements of the Electrical Inspection Service and the representative of the Department.

.2 Use decals of at least 175 x 250 mm.

1.17 SINGLE-LINE DIAGRAMS

.1 Provide and install single-line "as-built" plastic diagrams at the following locations:

.1 In the two existing electric rooms.

.2 Provide single-line diagrams "as constructed" in paper format.

.2 Drawings of at least 600 x 600 mm.

1.18 LOCATION OF OUTPUTS AND CURRENT SOCKETS

.1 It is forbidden to install outlets and outlets back to back in a wall: leave a minimum horizontal clearance of 150 mm between the boxes.

.2 The location of outlets and outlets may be changed at no additional charge or credit provided that travel does not exceed 3000 mm and notice has been given prior to installation.

.3 Place the light switches near the doors on the side of the handle.

1.19 MOUNTING HEIGHTS

.1 Unless specified otherwise, mounting height of equipment is given from the surface of the finished floor to the center line of the appliance.

.2 In cases where installation height is not indicated, check with competent persons before starting installation.

.3 Unless otherwise specified, install electrical equipment at the height shown below:

.1 Light switches and dimmers: 1372 mm

.2 Wall outlets:

.1 in general: 400 mm

.2 over counter or backsplash: 178 mm

.3 exterior: 1000 mm above finished grade level

.3 Distribution panels: as per Code requirements or as indicated

.4 Telephone and computer connections: 400 mm

.5 Emergency lighting: 2100 mm

.6 Manual station: between 1200 mm and 1400 mm

.7 Horn / visual horn: at least 150 mm below ceiling. The entire lens shall be at least 2000 mm and not more than 2400 mm above the floor.

.8 Insulator module: located in a separate housing so that it is visible and accessible at all times.

.9 Mechanical installation: 1400 mm.

1.20 LOAD BALANCING

.1 Measure phase current at distribution panels under normal loads at final delivery. Distribute the connections of the bypass circuits so as to obtain the best current balance between the various phases and note the modifications made to the original connections.

.2 Measure voltages at load elements and adjust transformer sockets so that the voltage obtained is at 2% near the nominal voltage of the devices.

.3 Upon completion of the work, provide a report indicating normal loads under normal load on the phases and neutral of distribution panels, dry transformers and engine control centers. Specify the time and date at which each load was measured, and the phase-to-phase and phase-neutral voltage of the circuit at the time of verification.

.4 Provide reports in manuals.

1.21 IGNIFUGATION

.1 When cables or conduits pass through fire resistant floors and walls, stuff the gap between the wires and the sleeve and seal with a caulking product that meets the requirements of the UL , FM and which has withstood ASTM tests No. 383 and E-814.

.2 Contractor is responsible for compliance and quality of fire seals. To this end, a specialist will be required to select firewalls and specify the products required to ensure compliance.

1.22 QUALITY CONTROL ON THE SITE

.1 Test and pay for the following systems.

.1 The electrical distribution network, including phase, voltage and grounding control and load balancing.

.2 Circuits from branch panels.

.3 The lighting system and its control devices.

.4 Engines, heaters and related control equipment including sequential system operation controls, if applicable.

.5 Emergency lighting network.

.6 The fire alarm system.

.2 Provide certificate or letter from manufacturer confirming complete installation of each system.

.3 Dielectric Strength Tests:

.1 Measure the dielectric strength of circuits, arteries and equipment rated at not more than 350 V using a 500 V megohmmeter.

.2 Measure the dielectric strength of circuits, arteries and equipment at nominal voltage between 350 and 600 V using a 1000 V megohmmeter.

.3 Check ground resistance before switching on.

.4 Carry out tests in the presence of the Departmental Representative.

.5 Provide equipment, meters, meters equipment and personnel required for testing during installation and completion.

.6 Submit test results to Departmental Representative.

1.23 COORDINATION OF PROTECTIVE DEVICES

.1 Make sure that circuit protection devices such as circuit breakers, overcurrent trip units, relays and fuses are installed and that they are of the required size and set to the required values. Write inside the equipment, the capacity of the fuses and other equipment when they are removable.

1.24 SPECIAL WORK

.1 The price for the performance of all overtime work will be included in the bid. No further remuneration will be granted thereafter for this purpose.

1.25 ADDITIONAL WORKS

.1 For all requests for additional work or to be credited, the contractor must provide a detailed estimate of the work: the quantity and unit price of each of the materials required and the price of labor for each of the works.

.2 At the request of the Departmental Representative, the Contractor shall provide invoices for the purchase of materials.

1.26 DISMANTLING EXISTING WORKS

.1 Carefully review the plans to assess and include in the price the dismantling of existing structures. This includes the work necessary to carry out all the constructions according to the plans and specifications.

.2 Dispose of any ducts, cables, appliances that are no longer required in inter-ceilings, crawl spaces, roofs, in the walls, on the walls, etc. This clause applies to all existing works, whether visible or hidden.

.3 Take all necessary precautions to minimize breakage of walls, ceilings, floors, etc.

.4 The Contractor shall ensure the proper functioning of the equipment removed and reinstalled. He shall notify the Departmental Representative in writing of any defects before commencing work. Subsequently, the Contractor becomes responsible for the equipment.

1.27 MAINTENANCE OF SERVICES

.1 In the case of major alterations to the main entrance of electricity or any other service within the building requiring a temporary shutdown of this service, the Contractor shall submit sufficiently in advance to coordinate with all stakeholders any interruption of service.

.2 Provide all personnel and equipment necessary to ensure that interruptions are as short as possible. Provide power transfers or other services during the evenings, nights or weekends, as required by the Departmental Representative. If, at the request of the departmental representative, certain services are to be maintained, the Contractor must make the connections and provide the necessary equipment and accessories to ensure the continuity of these services.

1.28 EXISTING MATERIALS

.1 Unless otherwise indicated, existing materials removed but not specifically requested to be relocated shall be returned to the Departmental Representative at the place designated by the Department. A list of equipment is given to the Contractor at the beginning of the work.

1.29 EQUIPMENT PRESERVED

.1 The Contractor shall provide, install and connect the wiring and conduits necessary to ensure the continuity of electrical services in sections of the building not directly affected by its work.

1.30 EXECUTION

.1 Modify existing wiring to make connections to new devices.

.2 Remove existing electrical appliances when an existing bulkhead is removed. The Contractor shall provide for the removal of conductors, conduits and exit boxes.

.3 Provide all new required circuit breakers of the same brand and breaking capacity as the circuit breakers in place.

.4 Modify the existing electrical distribution as shown on the drawings.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This Section specifies the materials and installation for wire and box connectors.

1.2 REFERENCES

.1 CSA International

.1 CAN / CSA-C22.2 No. 18-F98, Outlet Boxes, Duct Boxes, Fittings and Accessories.

.2 CAN / CSA-C22.2 No. 65-F03, Wire Connectors (trinational standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Association of Electrical and Electronic Equipment Manufacturers of Canada (AMEEC)

.1 EEMAC 1Y 2-1961, Connectors for bushing terminals and aluminum adapters (rated current 1200 A).

.3 National Electrical Manufacturers Association (NEMA).

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by the representative of the designated Ministry.

PART 2. PRODUCTS

2.1 MATÉRIALS

.1 Cable pressure connectors in accordance with CAN / CSA C22.2 No. 65, copper current carrying elements, copper alloy suitable for copper conductors, as required.

.2 Splicing connectors for lighting fixtures in accordance with CAN / CSA-C22.2 No. 65, with copper alloy current carrying elements, suitable for copper conductors of size 10 AWG or less.

.3 Connectors for bushing terminals complying with the relevant NEMA standards and consisting of the following components.

.1 Connector body and clamp for conductor, stranded, round, tube, copper or aluminum bar according to the drawings.

.2 Clamping flange for conductor, stranded round, made of copper.

.3 Clamp for conductor, stranded in aluminum.

.4 Bolts for clamping flanges.

.5 Caliber suitable for conductors as indicated.

.4 Clamping flanges or connectors for armored cables, TECK cable and flexible ducts, as required, in accordance with CAN / CSA-C22.2 No. 18.

PART 3. EXECUTION

3.1 EXAMINATION

.1 Verification of conditions: Before installing cable and box connectors, ensure that the condition of surfaces / substrates previously implemented under other sections or contracts is acceptable and In accordance with the manufacturer's written instructions.

- .1 Visually inspect surfaces / supports.
- .2 Begin installation work only after correcting unacceptable conditions.

3.2 INSTALLATION

.1 Carefully stripper the ends of conductors and cables and, as appropriate, proceed as follows:

- .1 Apply a layer of zinc seal paste to the splices of the aluminum cables before installing the connectors.
- .2 Install pressure connectors and tighten screws using a compression tool recommended by the manufacturer. The installation must conform to the tightening tests performed in accordance with CAN / CSA-C22.2 No. 65.
- .3 Install luminaire connectors and tighten to CAN / CSA-C22.2 No. 65. Replace insulating cap.
- .4 Install bushing terminals in accordance with applicable NEMA standards.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This Section specifies copper, ACM alloy and aluminum conductors rated from 0-1000 Volts and the most common electrical insulation and covering materials. This Section does not include fire rated building wiring to ULC S139 and CSA C83, marine, hazardous, mining, instrumentation, communication and fire alarm wiring

1.2 REFERENCES

.2 C22.10-10 Canadian Electrical Code, Part 1.

1.3 DOCUMENTS TO BE SUBMITTED

.3 Data sheets

.1 Submit the required technical specifications and the manufacturer's specifications and documentation for each cable. The data sheets must indicate the characteristics of the products, the performance criteria and the dimensions

PART 2. PRODUCT

2.1 BUILDING WIRE

.1 Conductors: stranded if they are 10 AWG or larger; Minimum size: 12 AWG.

.2 Copper conductors: of the specified size, insulated in crosslinked thermosetting polyethylene, for voltage of 600 V, and type RW90 XLPE, RWU90 XLPE.

2.2 TECK 90 CABLE

.1 Conductors

.1 Ground conductor: copper.

.2 Supply conductors: copper according to specifications, of the size indicated.

.3 Power Conductors: Copper Minimum # 1 AWG.

.2 Insulation

.1 Crosslinked polyethylene (XLPE).

.2 Rated voltage: 600 V..

.3 Sheath: polyvinyl chloride.

.4 Metallic armor: stapled aluminum strip.

.5 Outer casing: made of thermoplastic polyvinyl chloride.

.6 Fastenings :

.1 One-hole steel fixing flanges for exposed cables of 50 mm or less. Two-hole fixing flanges, made of steel, for cables over 50 mm.

.2 U-racks for groups of two or more cables.

.3 Threaded suspension rods: 6 mm diameter, for suspended U-brackets.

.7 Connectors

.1 Waterproof or explosion proof models approved for use with TECK cables.

2.3 ARMOURED CABLES

.1 Conductors: insulated, of copper, of the specified size or of aluminum with a minimum size of 1 AWG.

.2 AC90 (BX) type cables.

.3 Metallic armor: aluminum foil.

.4 Includes a grounding conductor protected by aluminum foil.

.5 ACWU90 type cables, with PVC covering covering the armor, in accordance with Building Code requirements for the building class of this project, for cables placed in a wet location.

.6 Connectors: short-circuit connectors.

2.4 CONTROL CABLES

.1 LVT-type cables: 2 copper-copper conductors of the specified size.

.1 Insulation: thermoplastic.

.2 Sheath: Thermoplastic envelope and tightly wound aluminum wire armor.

.2 Low-voltage control cables, for voltage of 300 V, solid copper conductors, stranded, of the specified size.

.1 Insulation: PVC.

.2 Outer casing: PVC coated aluminum armor.

.3 Control cables for 600 V voltage: 4 stranded annealed copper conductors of the specified size.

.1 Insulation: TW rubber R90 crosslinked polyethylene R90 (crosslinked) RW90 (crosslinked).

.2 Outer envelope: thermosetting with sheath in staple weave and envelope on PVC sheath.

2.5 FIRE ALARM CABLES

.1 Fire alarm cables:

.1 The twisted / shielded cables will be installed in "EMT" conduit pipes without armor and will have the following characteristics:

.1

.2 Massive bare copper conductors.

.3 PVC insulation.

.4 Red PVC sheath.

.5 According to CSA standard FAS-105, 300 V, identified FT-4.

.6 Cable 2 # 18 twisted / shielded for all addressable networks for detection, monitoring, control and control. In the pipeline, provide one (1) green #18 conductor for grounding all sensing, monitoring, control and control housings and devices.

.7 Cables 2 # 16 for all signaling networks. In the pipe, provide one (1) green #16 conductor for grounding all enclosures and signaling devices.

2.6 COLOR OF CONDUCTORS

.1 In the branching circuits of the systems, the colors of the phases will be black, red, blue, etc., and the neutrals will be white.

.2 The earthing conductors will be installed in all conduits of type C.P.V., E.M.T., empty metal ducts. The conductors used for grounding shall be insulated and green in color and shall be of required capacity according to the Electrical Code.

.3 The conductors used for earthing equipment, special outlets, special sockets, insulated electrical outlets, shall be insulated and green in color and shall be of the required capacity according to the Electrical Code.

2.7 CALIBRATION OF DRIVERS

.1 The minimum gauge of copper conductors shall be No. 12 AWG unless otherwise specified.

.2 The No. 10 and smaller conductors will be of the solid type.

.3 Drivers 8 and larger will be stranded.

.4 The size of the conductors, the dimensions of which are indicated on the plans, is minimal. Where conductors are not shown on plans, provide and install conductors of the type and size that meet the requirements of the Canadian Electrical Code, last edition.

PART 3. EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system

.4 Conduct testing to competent personnel.

.1 Provide necessary instruments and equipment.

.5 Check the continuity of all feeding arteries; Ensure they are free of short circuits and ground leaks.

.1 Ensure that the resistance between ground and each circuit is not less than 50 megohms.

.6 Pre-acceptance testing

.1 After laying the cables but before splicing and connecting, measure the insulation resistance of each phase conductor using a 600 V megohmmeter.

.2 After performing each splice and / or connection, check the insulation resistance to ensure that the cable network is ready for the acceptance test.

.7 Reception tests

.1 Ensure that all terminations and attachments are disconnected.

.2 Ground shields, earth wires, metallic armor and non-test conductors.Essais de rigidité diélectrique

.1 Test the dielectric strength according to the manufacturer's recommendations.

.3 Leakage current test

.1 Increase the voltage in steps from 0 to the maximum value prescribed by the manufacturer for the type of cable being tested.

.2 Maintain the maximum voltage for the period prescribed by the manufacturer.

.3 Note the value of the leakage current at each step.

.8 Provide a list of test results indicating the location of each test point, the circuit being tested and the result of each test.

.9 Completely remove and replace any length of cable that does not meet the test criteria.

3.2 GENERAL CABLE INSTALLATION

.1 Parallel feeding arteries must be of the same length.

.2 Attach or clip power supply line cables to distribution centers, pull boxes and terminations.

.3 Route the hidden wiring through the walls in descending or vertical loops to facilitate further work. Unless otherwise indicated, avoid routing the wiring from the bottom to the top as well as horizontally into the walls.

.4 Use only two-wire circuits for branching to the surge suppressed outlets as well as for permanently connected electronic and computer equipment. Common neutral circuits are prohibited.

.5 The control wiring must be identified by clamps with numbering corresponding to the legend of the shop drawings.

3.3 INSTALLATION OF BUILDING WIRES

.1 The wiring for connecting the motors and transformers inside from a junction box near the motor or transformer will be in "Liquid-Tight" armored cable; This last box will be part of a network of ducts.

.2 Unless otherwise indicated on the plans, provide an additional green insulated conductor of appropriate size to ensure continuity of masses in each thin-walled conduit (EMT type).

3.4 INSTALLATION OF ARMOURED CABLES

.1 As much as possible, group the cables on U-brackets.

.2 It is permissible to use armored AC90 (BX) cables only for powering recessed luminaires in suspended ceilings, between a junction box and the unit. AC90 wiring that will supply multiple power outlets will have to flow up and down vertically without any bifurcation or any passage through the posts, and not horizontally in the bulkhead.

.3 The use of "Ty-Rap" type fasteners is not permitted.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section applies to U-rails for surface mounting or suspended posts.

PART 2. PRODUCTS

2.1 U-SHAPED SUPPORTS

.1 Supports, U-profiles, 41 x 41 mm, 2.5 mm thick, laid on a suspended surface.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Secure the equipment to solid masonry, tile and plaster surfaces using lead anchors.

.2 Secure the equipment to poured concrete surfaces with built-in expandable anchors.

.3 Under no circumstances use the suspended ceiling or its suspensions to install lighting, ducts, etc.

.4 Duct or cable support material consisting of staples, spring bolts and cable ties designed as accessories to basic supports, U-profiles.

.5 A fastener for securing exposed cables or conduits to the frame or building components of the building.

- .1 One-hole steel flanges for surface mounting of conduits and cables 50 mm or less in diameter.
- .2 Two-hole steel flanges for fixing ducts and cables over 50 mm in diameter.
- .3 Clamping flanges for fixing the ducts to exposed steel framing elements.

.6 Suspended support systems:

- .1 Support each cable or conduit with 6 mm diameter threaded rods and spring clips.
- .2 Support at least two cables or ducts on U-profile bars suspended from 6 mm diameter threaded suspension rods where it is not practical to attach them directly to the frame of the building.

.7 Surface mounting brackets for supporting two or more ducts on U-profile bars, installed at 1.5 m center distance.

.8 Provide metal brackets, frames, hooks, clamps, and other types of brackets at specified locations or where necessary to support ducts and cables.

.9 Provide adequate support for piping and cables placed vertically to equipment when there is no wall support.

.10 Do not use ligature wire or perforated strip to support or secure pipes or cables.

.11 Do not use brackets or equipment installed for other trades, such as support for ducts or cables; Except with the permission of people from these other trades and with the approval of the representative of the Ministry.

.12 Install fasteners and brackets as required for each type of equipment, conduit and cable and as recommended by the manufacturer for installation.

.13 The supports and anchors used for the installation of equipment and conduits shall comply with the earthquake protection requirements of the NBC in force. An evaluation by a specialized engineer in seismic protection is required for all ties and braces of the installed systems. Provide a compliance report as well as shop drawings for approval.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers general and specific requirements for junction boxes, draft boxes and distribution boxes.

1.2 REFERENCES

.1 Canadian Standard Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1.

1.3 SUBMITTALS

.1 Product Date

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

PART 2. PRODUCTS

2.1 BOÎTES DE RÉPARTITION

.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Terminals: The mains and branch terminals or the terminal blocks must correspond to the size and number of input and output conductors connected to them, as indicated.

.3 Reserve terminals: Provide at least three (3) terminals or spare terminals for each terminal block or terminal block designed for a nominal current rating of less than 400 A.

2.2 JUNCTION AND PULL BOXES

.1 Construction:welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted : screw-on flat covers

2.3 CABINETS

.1 Type E Empty : made of steel sheet, for surface mounting, with folded and overlapping edges, fitted with a hinged door, handle, lock and latch.

.2 Type T Terminal : Made of steel sheet, for surface mounting or flush mounting, equipped with a hinged door, a latch, a lock with two keys and a rear 19 mm plywood back panel, thickness.

PART 3. EXECUTION

3.1 SPLITTER INSTALLATION

.1 Mount plumb, true and square to building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise..

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.3 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating, system name, voltage and phase or as indicated.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers general and specific requirements for outlet boxes, branch boxes and accessories.

1.2 REFERENCE

.1 CSA C22.10, Canadian Electrical Code, Part 1.

.2 CAN/CSA C22.2 n.18 – Safety standards for outlet boxes, duct boxes, fittings and accessories.

PART 2. PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.10, lasted edition.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped

.6 Use 38 mm (1 1/2 ") deep boxes, complete with plasterboard in all bulkheads, insulated and in exterior walls.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 Electrogalvanized steel boxes for installation of single or multiple flush-mounted devices, with minimum dimensions of 76 x 50 x 38 mm, or as indicated. Outlet boxes 102 mm side when more than one conduit enters the same side, with extension frames and plaster frames, as required.

.2 Junction boxes made of galvanized steel, for connection to protruding EMT tubes, minimum dimensions 102 x 54 x 48 mm.

.3 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.4 Square 102 mm side outlet boxes with extension frames and plaster frames for flush mounted wiring devices in plaster or ceramic tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single or and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.6 FLOOR BOXES

.1 Electrogalvanized steel floor boxes, waterproof with concrete grout, with adjustable finishing collars with a brushed aluminum surface plate. Mounting plate with long or short fixing bar suitable for receiving single or double sockets. Boxes with a minimum depth of 28 mm for sockets and 73 mm for communication devices.

.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for 12 mm, and 19 mm conduit. Minimum size: 73 mm deep.

2.7 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 When 8 or more conductors enter boxes, the cables must be connected to terminals inside the boxes. No marrettes are accepted. The Contractor must identify the power circuits on the conductors, terminal blocks and on the enclosure lids.

.6 All openings in the vapor barriers must be sealed effectively to maintain the integrity of the vapor barrier.

.7 Vacuum clean interior of outlet boxes before installation of wiring devices.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section specifies rigid and flexible fasteners, fittings and installation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA C22.2 No. 18-F98 (C2003)], Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45-FM1981 (C2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-F04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-FM1985 (C2003), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-FM1984 (C2003)], Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-F05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada.

PART 2. PRODUCTS

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.

- .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

.4 Shielded cables with nominal voltage greater than 1 000 V must be wound and marked.

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.5 Underground ducts for medium voltage cables (up to 25 kV) for primary power supply shall be PVC type DB2 commonly referred to as "type II" in accordance with B.31.21.1-01 of Hydro-Québec and bear the inscription "Hydro Québec".

.6 Flexible metal conduit: to CSA C22.2 No. 56, aluminum, liquid-tight flexible metal.

2.3 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm and smaller

.1 Two hole steel straps for conduits larger than 53 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

.5 Maximum duct fastener spacing :

.1 All rigid metallic ducts of the same size must be securely fastened to supports or to a solid surface and the maximum spacing between attachment points shall be:

.1 1.5 m for ducts of nominal size 21 (3/4).

.2 2 m for ducts of nominal size 27 (1) and 35 (1-1 / 4).

.3 3 m for pipes of nominal size 41 (1-1 / 2) and more.

.2 If rigid metal ducts of different sizes are combined, the maximum spacing of the duct fasteners shall be that specified in paragraph 1 for the smallest duct.

.3 If a flexible metal conduit is installed, it shall be secured at intervals not exceeding 1.5 m and less than 300 mm on each side of any outlet box or packing, except in the case of Flexible metal conduit installed by pulling and in the case of lengths not exceeding 900 mm if a certain flexibility is required at the terminals.

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion, ensuring grounded network continuity.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 21 mm deflection, ensuring grounded network continuity.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

.1 polypropylene.

PART 3. EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

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

3.2 GENERAL

.1 Where the ducts are shown on the plans, they are shown in schematic form only. Install the visible ducts so as not to reduce the free height of the room. Before commencing work, verify the location of all ducts with the departmental representative.

.2 The duct runs installed in parallel must be of the same length.

.3 Arrange for the cutting of openings, drilling of holes and other structural work necessary for the installation of electrical conduits, cables, pull wires, pull boxes and outlet boxes.

.4 Openings in concrete beams, walls and floors must be approved by the Departmental Representative.

3.3 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in unfinished areas.

.3 Use galvanized and threaded rigid conduits as shown in the drawings:

.1 Outdoors for areas exposed to moisture, water and weather.

.2 Inside for areas exposed to moisture, water and weather.

.3 Inside locations exposed to mechanical damage.

.4 In explosion-proof areas.

.4 Use electrical metallic tubing (EMT) :

.1 For exposed indoor installations.

.2 In inter-ceilings and in drywall walls.

.3 In block walls and other similar walls.

.4 For electrical distribution.

.5 For red fire alarm networks.

.6 For telecommunication systems (telephone and computer).

.5 Use epoxy coated conduit in corrosive areas.

.6 Use rigid PVC conduit underground.

.7 Use flexible metal conduit for connection to motors in dry areas connection to recessed incandescent fixtures without prewired outlet box, connection to surface or recessed fluorescent fixtures, work in movable metal partitions, No exposed metal hoses will be accepted.

.8 Use flexible and liquid tight metallic conduits when connecting motors or vibrating equipment in damp or wet rooms or corrosive environments. Flexible ducts such as "AC90 (BX)" or "TECK90" are not acceptable. The flexible and watertight metallic conduits shall bear the identification FT 4 and shall not exceed 1,500 mm in length.

.9 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.10 Mechanically bend steel conduit over 19 mm diameter.

.11 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.12 Supply and install a 6 mm polypropylene pull cord in all empty ducts of all systems, in all empty ducts for future prediction to facilitate pulling of wires and / or cables.

.13 Run 2-27 mm spare conduits up to ceiling space and 2-27 mm spare conduits down to ceiling space from each flush panel.

.1 The ducts must end in 305 mm x 305 mm x 102 mm junction boxes housed in the ceiling.

.14 Remove and replace blocked conduit sections.

.1 .Do not use liquids to clean out conduits

.15 Dry conduits out before installing wire.

.16 The ducts must never touch the equipment of the mechanical services (connections excluded). A minimum clearance of 75 mm shall be maintained between the ducts and any insulated steam pipe.

3.4 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended channels.

.5 Do not pass conduits through structural members except as indicated.

3.5 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings, unless otherwise stated in the plans and specifications.

3.6 CONCRETE BASES, HOLES AND SLEEVES

.1 Be responsible for the location, size and location of all concrete openings and bases necessary for the performance of the work.

.2 Provide ample advance notice to the general contractor or any other subcontractor concerned to ensure that all openings, concrete bases or cribs required for the proper installation of the equipment are completed in a timely manner.

.3 Whatever the conduit, etc. Which passes through a bulkhead, wall or partition where fire resistance is prescribed, provide and install a suitable metal sleeve. The outside seal to the sleeve will be made by the contractor. When the conduit, etc. Is installed before the construction of the wall, the sleeves will be in line on the conduits, etc., and the positioning will be the responsibility of the one who erects the wall.

.4 Consult with Departmental Representative prior to, and obtain permission for, drilling floors, walls, ceilings, beams or any other part of the structure.

.5 Unless otherwise indicated on the drawings, all openings and openings of 150 mm Ø or more shall be executed by the General Contractor and coordinated with the Departmental Representative. The smaller openings or openings will be executed by subcontractor of the specialty.

.6 The subcontractor of each section shall be responsible for the location and provision of all sleeves necessary for the execution of this work in accordance with the preceding paragraph.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 Systems and devices to protect against earthquake-related shock effects.

1.2 REFERENCES

.1 Canadian Association CSA International.

.2 National Fire Protection Association.

.3 FM Global.

.4 ASHRAE – Practical Guide to Seismic Restraint.

.5 SMACNA – Seismic Restraint Manual Guidelines for Mechanical Systems.

1.3 DESCRIPTION

.1 All electrical work must meet the requirements of the Quebec Construction Code, concerning protection against earthquakes.

To this end, each subcontractor of each specialty must retain the services of a specialist, engineer member of the Ordre des ingénieurs du Québec, to perform the calculations and specify the supports and their arrangement. At the end of the work, an inspection will be carried out by the latter and a report of conformity will be produced to the representative of the Ministry.

.2 The following equipment and / or systems shall remain operational during and after earthquakes:

.1 Lighting fixtures.

.2 Emergency lighting system.

.3 Electrical distribution.

.4 Fire alarm system.

.5 Cable duct and cable system;

.6 Emergency generator and transfert switch.

1.4 CHARACTERISTICS OF PARASISMIC PROTECTION SYSTEMS

.1 Seismic protection systems shall be compatible with, and fully integrated with, the following:

.1 Acoustic and anti-vibration devices prescribed in drawings and specifications.

.2 Design features of building and electrical installations.

.2 Building risk category and location category

.1 The risk category of the building and the category of location according to the seismic response shall be determined by the representative of the Ministry specializing in seismic protection systems.

1.5 DOCUMENTS TO BE SUBMITTED

.1 1 Submit design report for each electromechanical system, including:

.1 Name and project number as shown on plans and specifications.

.2 Name of electromechanical system to which report applies.

.3 Design criteria for the earthquake protection system of the electromechanical system, including:

.1 Location of Project.

.2 The value of Sa (0.2), as given in the CCQ and CNB, for the location of the project.

.3 Category of project location based on seismic response of site.

.4 The value of Fa as a function of the location category and the value of Sa (0.2).

.5 The hazard category of the building.

.6 The risk coefficient for loads and effects due to IE earthquakes.

.7 The height of the building above the ground.

.8 The technical components of the electromechanical system exempted and the reason for exemption.

.9 List of all technical components of the electromechanical system to be selected against seismic loads.

.4 Calculations of earthquake loads created by seismic stresses of all technical components to be calculated, showing:

.1 Identification of the technical component, as it appears on the plans and specifications.

.2 Location of technical component, including height hx.

.3 Type of technical component.

.4 The manufacturer's model.

.5 The weight of the technical component and its coefficients Cp, Ar and Rp.

.6 The calculated lateral design load Vp of the technical component.

.7 Structural loads.

.5 Calculations of equipment overturning on a ground, slab or roof basis, showing :

.1 Dimensions of technical component, including length, width or depth , height and center of gravity.

.2 Moment of reversal.

.3 Reversal moments.

.6 Means for countering calculated seismic stresses, including:

.1 Resistance to seismic stress.

.2 A sketch showing the installation intended to attenuate the seismic load.

.3 Plans showing location and type of longitudinal, transverse, longitudinal and transverse seismic attachment.

.4 Specification of acceptable products of each part to be used for seismic protection, including anchors, bolts and nuts, aircraft cables and equipment.

.7 The signature of the engineer who carried out the design report and his membership number of the Ordre des ingénieurs du Québec, his business address, telephone number and e-mail.

.2 At the end of the work, have the work inspected and submit a compliance report for each electromechanical system, including:

.1 Project title and project number as they appear in the quote.

.2 The discipline to which the report applies.

.3 Title of design report to which compliance is analyzed.

.4 Analysis of the earthquake fixation of each technical component for which the design report required seismic protection.

.5 Photos showing seismic fixation system applied to each technical component.

.6 A conclusion that the seismic protection system installed meets the requirements of the design report and the reference codes and standards.

.7 The signature of the engineer who carried out the design report and his membership number of the Ordre des ingénieurs du Québec, his business address, telephone number and e-mail.

PART 2. PRODUCTS

2.1 GENERAL

.1 The design engineer of the seismic protection system shall ensure that the components of the seismic protection system provided by the contractor comply with the requirements of its design report.

2.2 MATERIAL AND EQUIPMENT OF THE PARASISMIC PROTECTION SYSTEM

.1 Simple cartridge fasteners and anchors shall not be used to withstand tractive loads.

.2 Friction supports, such as C-beam fasteners, are prohibited for support of technical components unless they are fitted with a retaining mechanism such as:

.1 Holding strap 25 mm wide, gauge 16, for 10 mm and 15 mm suspension rods.

.2 Holding strap 32 mm wide, 14 gauge for suspension rods 18 mm to 20 mm.

.3 Friction supports, such as C-beam fasteners, are prohibited for earthquake-resistant fasteners.

.4 Any anti-vibration spring or rail must be earthquake resistant, that is, manufactured with a blockage preventing its overflow during an earthquake. Holding cables are not acceptable as a means of resisting seismic loads.

2.3 ENTRY OF UTILITY PIPES IN THE BUILDING

.1 Provide means to ensure the flexibility of the pipelines to prevent breakage of pipelines in the event of an earthquake.

PART 3. EXECUTION

3.1 GENERAL

.1 The design engineer of the seismic protection system must ensure that the installation of the seismic protection system by the contractor meets the requirements of its design report.

3.2 INSTALLATION CRITERIA FOR PARASISMIC DEVICES

.1 Seismic devices shall not interfere with the normal operation of the building or its technical components.

.2 Diffusers in false ceilings in exit corridors shall be anchored to the suspended ceiling or to the structure of the building.

.3 Fluorescent fixtures in false ceilings shall be secured to the structure by means of a gauge 16 gauge cable or a 12 gauge steel pin at the opposite two corners.

.4 Any pendulum-type luminaire shall be secured to the structure by means of a flexible attachment - steel cable or rope - with a permissible load of not less than twice the weight of the luminaire. In addition, the luminaire must be capable of oscillating at 45 ° without the risk of touching anything

3.3 INSTALLATION

.1 Install the anti-seismic fixings of each electromechanical system as described in the design report.

3.4 TRAINING OF THE ENTREPRENEUR'S EXECUTIVE PERSONNEL

.1 The design engineer of the seismic protection system is responsible for ensuring that the contractor and its personnel are competent and trained to perform an earthquake resistant installation that meets the requirements of its report Design.

.2 The design engineer shall ensure that the contractor and his staff take into account the following issues:

.1 Thermal expansion and contraction of piping.

.2 Vibration of technical components.

.3 Springs and shock absorbers used to support technical components.

3.5 CONTROL OF QUALITY ON SITE

.1 Inspection and certification of seismic protection devices and systems.

.1 Upon completion of installation work, earthquake protection devices and systems shall be verified by the design engineer.

.2 Submit compliance report once deficiencies have been corrected (if applicable).

.2 Documents required for commissioning

.1 Compliance report must be provided to Departmental representative prior to commissioning of system.

.2 Upon completion of the certification and acceptance of the report, provide a complete copy of the revised and annotated project file in order to show the conditions for completion.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers general requirements for the identification of electrical systems.

1.2 DOCUMENTS / SAMPLES TO BE SUBMITTED

.1 Submit samples in accordance with Section 26 05 00 - Electricity - General Requirements for Results of Work and the Appendix to this Section.

.2 Submit samples and designation legend before engraving.

PART 2. PRODUCTS

2.1 IDENTIFICATION PLATES FOR ELECTRICAL EQUIPMENT

.1 Colors

.1 Normal network: white lettering on black background.

.2 Emergency network: white lettering on red background.

.2 Fabrication

.1 General features: 3 mm thick, lamicoid plastic or white anodized aluminum, matte finish, square corners, precisely aligned letters and machine engraved into the core.

.2 Provide a maximum of 25 letters or numbers per plate.

.3 Dimensions

.1 In accordance with the table below :

Size n^{o}	Dimensions		Numbers of lines	Height of letters	
	(mm x mm)	(po x po)		(mm)	(po)
1	10 x 50	3/8 x 2	1	3	(1/8)
2	13 x 75	½ x 3	1	5	(3/16)
3	13 x 75	½ x 3	2	3	(1/8)
4	20 x 100	¾ x 4	1	8	(5/16)
5	20 x 200	¾ x 8	1	8	(5/16)
6	20 x 100	¾ x 4	2	5	(3/16)
7	25 x 125	1 x 5	1	12	(1/2)
8	25 x 125	1 x 5	2	8	(5/16)
9	35 x 200	1 3/8 x 8	1	20	(3/4)
10	40 x 125	1 ½ x 5	3	6	(1/4)
11	20 x 75	¾ x 3	1	6	(1/4)

2.2 IDENTIFICATION FOR CURRENT SOCKETS AND SWITCHES

.1 Materials

.1 Normal network: transparent "P-Touch" tape of 9 mm width with black lettering.

.2 Emergency network: transparent "P-Touch" ribbon of 9 mm width with red lettering.

2.3 IDENTIFICATION OF EMERGENCY LIGHTING EQUIPMENT

.1 Materials

.1 Identify all lighting fixtures connected to the emergency room with a red 6 mm diameter sticker with a scratch resistant laminate finish.

2.4 BILINGUAL INSCRIPTIONS

.1 Entries used to identify systems and elements must be in English and French.

PART 3. EXECUTION

3.1 GENERAL

.1 Provide ULC and / or CSA approval plates required by each of the respective agencies.

.2 A procedure for identifying equipment will be provided by the Minsitère representative. This procedure comprises an identification logic assembly which makes it possible to determine the type of equipment, its location, etc. Identify equipment according to this procedure.

.3 Installation of circuit identification shall be carried out from each equipment and / or outlet to the main power source.

.4 Prior to identification of equipment and circuits, submit the designation legend to the Departmental Representative for approval.

.5 Circuit numbers shall be marked on all junction box covers using a black felt pen.

.6 Provide an average of (25) twenty-five letters per plate.

.7 Entries must be bilingual.

.8 Nameplates of terminal boxes and junction boxes shall indicate the network and / or voltage characteristics. Each terminal block must be identified.

.9 Nameplates on disconnectors, starters and contactors shall indicate the controlled apparatus, voltage and supply circuit.

.10 Nameplates on terminal boxes and pull boxes shall indicate the network and voltage.

.11 Nameplates affixed to transformers shall indicate primary and secondary power and voltages.

.12 The nameplates affixed to the electrical distribution panels shall indicate the name of the equipment and the power supply circuit.

3.2 LOCATION OF IDENTIFICATION PLATES

.1 The plates shall clearly identify the appliances and shall be placed in places where they are clearly visible and easily legible from the work floor.

.2 Do not apply paint or heat insulation to the identification plates.

.3 Provide and install identification plates for substations with all circuit breakers, power centers with all circuit breakers, distribution centers with all circuit breakers, power panels, distribution panels, transformers, gutters, distribution boxes, Motor control centers with all starters, variable frequency drives, starters, contactors, panels, cabinets, main draw boxes, main junction boxes.

3.3 SOCKETS, SWITCHES AND OTHER SIMILAR DEVICES

.1 Provide identification marks on all sockets, switches and similar devices.

.2 Install a ribbon across the width of the plate and turn the ribbon inside each side of the plate.

.3 Record circuit numbers inside all outlet boxes and switches. Use a white ribbon and fix it on the wiring inside the box.

.4 The circuit number shall be entered in its entirety and shall include the number of the distribution panel followed by the circuit number (ex. PS-1, 22).

3.4 ELECTRICAL EQUIPMENT

.1 Record source of power to the following locations and equipment:

.1 Power centers, power panels, distribution centers, distribution panels: above the circuit breakers and behind the door.

.2 Transformer, disconnector, gutter, distributor box, starter, contactor, variable frequency drive, panel, cabinet, pull box, junction box: on outer housing.

.3 Motor control center: on outer casing near CCM identification.

.2 Enter the name of the equipment serviced by the following equipment :

.1 Starter motor, contactor, motor control center, variable frequency drive, disconnect switch on the top of the housing of each equipment.

.3 Identify distribution boxes using identification marks.

3.5 LIGHTENING DEVICES

.1 Identify all lighting fixtures connected to the emergency with a red sticker of 6 mm diameter with a laminate resistant finish.

3.6 EXISTING NETWORK

.1 Enter the circuit numbers on all junction boxes of existing circuits to be retained or relocated using a black felt.

.2 When the wiring of a circuit is removed to a junction box, enter on the latter the circuit number with the inscription "RESERVE".

3.7 WIRING DESIGNATION

.1 In each fire alarm panel and in all junction boxes, each conductor shall be identified by the circuit and loop number and using the "Z-type" electric wire identification suitable for the size of the wire or sticker manufactured from a printer designed for this purpose.

3.8 DESIGNATION OF CONDUITS, BOXES AND CABLES

.1 Assign a color code to conduits and metal sheathed cables.

.2 Apply color marks (paint or plastic tape) on cables or ducts every 15 m and at points where they penetrate a wall, ceiling or floor.

	Base Color	Additional Color
Up to 250 V	yellow	
Up to 600 V	yellow	green
Phone	green	
Others Networks		
Communication	green	blue
Fire alarm	red	

Emergency Communication	red	blue
Others safety systems	red	yellow

.3 Apply the colored strips to the pipes prescribed above using tapes. The base color band shall be at least 38 mm or twice the width of the complementary color, the complementary strip shall be 25 mm wide. This color code must be identifiable over the entire outer surface of the ducts.

.4 The strips should be applied according to the following guidelines :

.1 Every 15 m (50 ').

.2 Where ducts penetrate a wall, ceiling, or floor: the duct must be identified on both sides (reasonably close) of the wall through which it passes.

.3 When ducts meet junction box or draft box: near junction box or draft box.

.4 At the midpoint of the curved section of a duct, even if the distance between the strips is less than 15 m.

.5 On the lids of the boxes (on the visible side), indicate the circuit numbers and designation of the panel or its function. To do this, use a "P-Touch" sticker.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This Section specifies standard and custom panelboards and their installation.

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No 29-F11, Panelboards and enclosed Panelboards.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Date

.1 Submit manufacturer's instructions, printed product literature and data sheets for panelboards and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop drawing

.1 Include on drawings:

.1 Electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension

PART 2. PRODUCTS

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 120/240 V panelboards: bus and breakers rated for 10 kA (symmetrical) interrupting capacity or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Minimum of 2 flush locks for each panel board.

.6 Two keys for each panelboard and key panelboards alike.

.7 Copper bus with neutral of same ampere rating of mains.

.8 Mains: suitable for bolt-on breakers.

.9 Panel door frame with hidden bolts and hinges to allow access to circuit breakers and wires without having to remove the front panel.

.10 Trim and door finish: baked enamel.

.11 Isolated ground bus

.12 Include grounding busbar with 3 of terminals for bonding conductor equal to breaker capacity of the panel board

.13 Provide drip traps on all panels installed in sprinklered rooms.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02 - Moulded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Lock-on devices for 10% of 15 to 30 A breakers installed as indicated.

.5 Munir d'un dispositif de verrouillage tous les disjoncteurs des panneaux pour les charges sur la sécurité des personnes sans exception.

.6 The circuit breakers shall be of the common trigger type, equipped with a single lever on the multipole circuits.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 53 - Identification of electrical systems.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.

.4 Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door.

.5 Some tables as shown in the electrical distribution diagram will be combined with transient overvoltage surge unit.

PART 3. EXECUTION

3.1 CONTROL OF SITE QUALITY

.1 Inspect entire installation for proper physical damage, alignment, inking and earthing of equipment.

.2 Measure stable charge currents in each of the panel arteries. Rearrange the circuits in the panels to balance the phase loads within 10% of each other. Maintain appropriate phase sequence for multiple cable branch circuits.

.3 Check tightening torque of bolted connections and circuit breaker connections using a torque wrench or torque wrench calibrated to the manufacturer's specifications.

.4 Provide a report of the voltages and current for each phase of each of the signs at the time of its provisional acceptance of the work and the date and time.

3.2 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 00 - Common Work Results for Electrical or as indicated.

.4 L'extrémité supérieure de tous les panneaux doit être conforme au Code canadien de l'électricité, dernière édition.

.5 Connect all circuits to load elements.

.6 Connect neutral conductors to common neutral bus bar.

.7 Of each new installed flush panel, install two 25 mm spare conduits. Install two (2) ducts up to the ceiling void. Each conduit must terminate in a junction box of 152 x 152 x 102 mm or as shown on the drawings.

.8 In the enumeration of the circuits given on the plans for each panel, "free" means that a protective device will be installed for future use; The term "space" means that space and mounting accessories are provided for future protection.

3.3 BALANCING

.1 On the panels, the circuits must be distributed in order to allow the best balance between the phases. During commissioning, tests and measurements shall be carried out and any significant deviations shall be corrected at no additional cost.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by panelboards installation.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers wiring devices, particularly switches, sockets and cover plates, and related installation methods.

1.2 REFERENCES

.1 CSA International

.1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA numéro 42.1-F00 (C2009), Plaques-couvercles pour dispositifs de câblage en affleurement (norme binationale avec UL 514D).

.3 CSA C22.2 numéro 55-FM1986 (C2008), Interrupteurs spéciaux.

.4 CSA C22.2 numéro 111-10, Interrupteurs à rupture brusque tout usage (Norme binationale avec UL 20).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Date

.1 Submit the required data sheets and the manufacturer's instructions and documentation for the wiring devices. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish.

PART 2. PRODUCTS

2.1 SWITCHES

.1 Switches: Unipolar, 15A, 120V, three (3), four (4) channels compliant with CSA Standard C22.2 No. 55 and CSA Standard C22.2 No. 111.

.2 Switches: manually operated, universally applicable, ie, having the following characteristics:

.1 Connection holes: For 10 AWG wires.

.2 Contacts: silver alloy.

.3 Molded components made from urea or melamine resins to counter the effects of carbon deposits.

.4 Connection: side or rear.

.5 Color: to be confirmed at workshop drawing

.3 Switches: rated to full load in the case of fluorescent, incandescent and LED luminaires.

.4 For all jobs, use only switches from a single manufacturer.

2.2 OUTLET

.1 Dual power sockets, type CSA 5 15 R, 125 V, 15 A, U-shaped earthing compartment, complying with CSA C22.2 No. 42, having the following characteristics :

.1 Molded housing made of white urea resin.

.2 For lateral or rear connection of 10 AWG wire.

.3 Links to be converted into separate outlets.

.4 Eight (8) rear connection ports, four (4) screw terminals for side connection.

.5 Triple friction contacts and riveted earthing contacts.

.2 Single sockets, type CSA 5 15 R, 125 V, 15 A, U-shaped earthing socket, with the following characteristics :

.1 Molded housing made of white urea resin.

.2 For lateral or rear connection of 10 AWG wire.

.3 Four (4) rear connection ports, two (2) screw terminals for side connection.

.3 Other sockets for voltage and current rating as indicated.

.4 For the entire installation, use only plugs from a single manufacturer and industrial grade.

2.3 COVER PLATES

.1 Fit all wiring devices with a cover plate in accordance with CSA C22.2 No. 42.1.

.2 Stainless steel cover plates for protruding junction boxes.

.3 Stainless steel cover plates for wiring devices mounted in recessed outlet boxes.

.4 Cover plates: made of sheet metal for wiring devices mounted in ducting boxes of the FS or FD type.

.5 Aluminum, weatherproof molded lid plates with two (2) spring wings with seals for double sockets as indicated.

.6 Molded, spring-loaded molded lids, weatherproof, with seals for simple electrical outlets or switches, as indicated.

2.4 CONTROL OF QUALITY

.1 For the entire installation, use only cover plates from a single manufacturer.

PART 3. EXECUTION

3.1 EXAMINATION

.1 Verification of conditions: Before installing the wiring devices, make sure that the condition of the surfaces / supports previously implemented under other sections or contracts is acceptable and allows the work to be carried out in accordance with the instructions written by the manufacturer. Visually inspect surfaces / supports.

.1 Begin installation work only after correcting unacceptable conditions.

3.2 INSTALLATION

.1 Switches

.1 Install the one-way switches for the switch handle to be up when the contacts are closed.

.2 Install switches in grouped output boxes, when more than one switch is required at the same location

.3 Install the toggle switches at the height specified in 26 05 00 - Electricity - General Requirements for Work Results.

.4 Place light switches near doors on side of handle.

.1 On mechanical and elevator machinery premises, place switches near the doors on the side of the handle.

.5 Where there is more than one bypass that enters the pooled outlet boxes, install steel bulkheads to separate the bypasses. Make identification of the leads.

.2 Outlets

.1 Install outlets in grouped outlet boxes when more than one outlet is required at the same location.

.2 Install sockets at the height specified in 26 05 00 - Electricity - General Requirements for Work Results.

.3 Install differential circuit breaker terminals as shown.

.4 Do not install outlets and power outlets back to back in a wall; Leave a horizontal clearance of at least 150 mm between the boxes.

.5 The location of outlets and outlets may be changed at no additional charge or credit provided that the movement does not exceed 3,000 mm and that notice is given prior to installation.

.3 Cover plates

.1 On common wiring devices, install a suitable common cover plate.

.2 Cover plates that are designed for recessed boxes shall not be placed on protruding boxes.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section refers to special requirements for low-voltage fuses.

1.2 REFERENCES

.1 Canadian Association CSA International

.1 CAN/CSA-C22.2 n^{o} 248 – Low-voltage fuses.

.2 CSA-C22.2 n^{o} 106-F05 – Fuses with high breaking capacity (HRC-MISC).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop drawings and product data

.1 Submit the nominal performance specifications of each type of fuse used. The characteristics must include the average melting time for a given current intensity.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Ship fuses in original containers.

.2 Do not ship fuses installed in switchboard.

.3 Store fuses in original containers in storage cabinet and moisture free location.

1.5 EXTRA MATRIALS

.1 Provide six (6) spare fuses for each type of fuse installed.

.2 Install fuses in a cabinet for storage

PART 2. PRODUCTS

2.1 FUSES - GENERAL

.1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

.2 The fuses used must be compatible with the fuse holders that support them.

.3 Fuses: product of one manufacturer.

2.2 FUSES TYPES

.1 Class L fuses

.1 Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum. For installation in the bypasses of motors greater than 600 A.

.2 Unless otherwise specified, all fuses over 600 A shall be class L.

.2 Class J fuses

.1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum. For installation in motor bypasses where 50% or more of the load is motive.

.2 Type J2, fast acting, for all other installations.

.3 Unless otherwise specified, all fuses up to 600 A will be class J.

2.3 FUSE STORAGE CABINET

.1 Fuse storage cabinet, manufactured from thick aluminum, 750 mm high, 600 mm wide, 300 mm deep, hinged, lockable front access door finished in accordance with Section 26 05 00 - Common Work Results for Electrical.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.3 Ensure correct fuses fitted to assigned electrical circuit.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers the special features and requirements for molded case circuit breakers.

1.2 REFERENCES

.1 Canadian Association CSA International

.1 CSA-C22.2 no 5-F02, Molded Circuit Breakers and Circuit Breaker Casing.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit the data sheets in accordance with Section 26 05 00 - Electricity - General Requirements for the Results of the Work.

.2 Include the curves of the current time characteristics in the case of circuit breakers with a breaking capacity of 22,000 A symmetrical and more efficient at mains voltage.

PART 2. PRODUCTS

2.1 GENERAL REQUIREMENTS

.1 Molded circuit breakers, circuit breakers and earth leakage protection devices: Complies with CSA C22.2 No. 5.

.2 Molded case circuit-breakers, bolted to busbars: quick release, snap-action type, manually operated and automatic, with compensation for ambient temperature of 40 ° C.

.3 Circuit-breakers with common trigger: equipped with a single lever on the multipole circuits, so that an incident on one of the phases triggers the opening of all the phases. Do not use single-pole circuit-breakers connected by pin interlocking.

.4 Circuit-breakers with instantaneous magnetic actuators, acting only when the current reaches the setting value.

.1 Circuit-breakers with trippers which can be adjusted between 2 and 8 times the nominal current.

.5 Circuit-breakers with interchangeable actuators, as indicated.

.6 Circuit breakers shall have a breaking capacity as indicated.

2.2 THERMOMAGNETIC CIRCUIT BREAKERS

.1 Circuit-breakers, molded, automatic, actuated by thermal and magnetic triggers, providing protection with time delay inversely proportional to overload and instantaneous protection in case of short circuit.

.2 Minimum resistance to short-circuit currents coordinated with distribution panel characteristics.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers as shown.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section describes the construction features, accessories and related installation methods for switches with and without fuses.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CAN/CSA C22.2 no 4-FM89 (C2000), Enclosed Switches.

.2 CSA C22.2 numéro 39-FM89 (C2003), Fuseholder Assemblies.

PART 2. PRODUCTS

2.1 DISCONNECT SWITCHES

.1 Fusible, non-fusible, disconnect switch in CSA Enclosure to CAN/CSA C22.2 No.4, size as indicated.

.2 Provision for padlocking in on switch position by three locks

.3 Mechanically interlocked door to prevent opening when handle in OFF position.

.4 Fuses: size as indicated, in accordance with Section 26 28 13.01 - Fuses - Low Voltage

.5 Fuse holder: suitable, without adapter, for the type and rating of the indicated fuses.

.6 Cosses de raccordement pouvant recevoir les conducteurs en aluminium ou en cuivre.

.7 Quick-make, quick-break action

.8 ON-OFF switch position indication on switch enclosure cover.

.9 With auxiliary auxiliary contact (or "early break") to stop the variable frequency drive before switching off the power supply to the motor according to the drawings.

.10 With weatherproof housing type NEMA 3R, when installed outside.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 53 – Identification of electrical systems.

.2 Indicate name of load controlled on size 4 nameplate.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Install surface switches in unfinished premises such as electrical rooms and mechanical rooms.

.2 Install the switches on a self-supporting bracket constructed in place using "unistrut" type brackets, fixed to the floor and to the upper slab when these are connected to motors installed in mechanical rooms where no wall space is required. is available.

.3 Install fuses, as appropriate.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section applies to contactors for installations up to 600 Volts normally used to control heating or lighting loads and associated installation methods.

1.2 REFERENCES

.1 CSA International CSA C22.2 no 14-10, Industrial Control Equipment

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA ICS 2-2000 (R2005), Controllers, Contactors and Overload Relays Rated 600 V.

1.3 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data

.1 Submit manufacturer's instructions, printed product literature and data sheets for contactors and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2. PRODUCTS

2.1 CONTACTORS

.1 Contactors: to CSA C22.2 no 14.

.2 Contactors: electrically held by permanent magnets, controlled by pilot devices according to specifications and rated power corresponding to the type of load ordered. Contactors with half rated power are not accepted.

.3 Unless otherwise indicated, contactors with two (2) normally open auxiliary contacts and two (2) auxiliary contacts normally closed.

.4 Unless otherwise specified, contactors shall be mounted in a NEMA 1 type CSA enclosure.

.5 The contactor cover shall be provided with the following optional accessories as indicated.

.1 Red, green LED.

.2 Push-button "off".

.3 Manual shut-off switch.

.4 Switch "off".

.6 Control transformer: factory wired and mounted in contactor housing, 24 VAC control voltage.

2.2 EQUIPMENT IDENTIFICATION

.1 Identify equipment in accordance with Section 26 05 53 - Identification of electrical systems.

.2 Indicator plate, bearing the name of the load ordered, format 5.

.3 Contactors connected to the fire alarm system shall be provided with red nameplates identified as "fire alarm system".

PART 3. EXECUTION

3.1 INSTALLATION

.1 Install contactors and connect power wires and auxiliary control devices.

.2 Identify contactors with nameplates or labels indicating panel and circuit number.

.3 Test contactors in accordance with 26 05 00 - Common Work Results for Electrical.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section specifies manufacturing, performance, accessories and other special requirements for starters up to 600 V.

1.2 REFERENCES

.1 International Electrotechnical Commission (IEC)

.1 IEC 947-4-1-2002, Part 4: Electromechanical contactors and motor-starters.

.2 Canadian Standards Association (CSA International).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Shop Drawings:

.1 Provide shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec Canada.

.2 Provide shop drawings for each type of starter to indicate:

.3 Mounting method and dimensions.

.4 Starter size and type.

.5 Layout and components.

.6 Enclosure types.

.7 Wiring diagram.

.8 Interconnection diagrams.

1.4 CLOSEOUT SUBMITTALS

.1 Extra Materials:

.1 Provide listed spare parts for each different size and type of starter..

.1 Two (2) control transformers.

.2 Two (2) transformer fuses.

.3 Six (6) fuses of each capacity.

PART 2. PRODUICTS

2.1 MATERIELS

.1 NEMA-compliant starters.

.2 Starter rating shall conform to NEMA standard. The half-gauge and IEC starters are not accepted.

.3 All starters shall be at least 1 gauge.

.4 Unless indicated otherwise in plan, minimum resistance to short circuit currents of 35 kA effective symmetrical at 600 V.

2.2 MANUAL MOTOR STARTERS

.1 Manual single-phase or three-phase starters of gauge, type and nominal power as indicated in a NEMA 1 type enclosure, equipped with the following:

.1 fast-acting switching mechanism;

.2 One (1) thermal overload protection element per phase, with manual reset, with trigger indicator.

.2 Accessories :

.1 Oil tight labelled as indicated.

.2 Red LED to indicate "on" position.

.3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

.1 Magnetic and combined starters, of gauge, type and rating according to NEMA 1, NEMA 12 or NEMA 3R as shown in the drawings, supplied with the following components and characteristics.

.1 Contactor solenoid operated, rapid action type.

.2 Motor overload protective device in each phase, manually reset from outside enclosure.

.3 Wiring and schematic diagram inside starter enclosure in visible location.

.4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.2 Combination type starters to include fused disconnect switch with operating lever on outside of enclosure, and provision for

.1 Locking in "OFF" position with up to 3 padlocks.

.2 Independent locking of enclosure door.

.3 Provision for preventing switching to "ON" position while enclosure door open.

.4 Components life:

.1 The contacts must be long-life, silver alloy type, replaceable by the front of the starter. Blower boxes should facilitate the interruption of the arc between the contacts.

.2 The starter coil must be warranted for life.

2.4 CONTROL TRANSFORMER

.1 Single phase, dry type, control transformer with primary and secondary voltage as indicated, complete with secondary fuse, installed in with starter as indicated.

.2 Size control transformer for control circuit load plus 20% spare capacity.

2.5 OVERLOAD RELAYS

.1 Overload relays shall be of the Solid State type.

.2 Phase loss protection as shown in drawings.

.3 Manual reset.

.4 Adjusting trip current.

.5 Select relay class according to engine characteristics on site.

2.6 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.7 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 53 – Identification of electrical systems.

.2 Manual starter designation label, white plate, black letters, size 1, engraved as indicated.

.3 Indicator plates for magnetic starters, format 3, with black letters engraved on a white background, as indicated.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Install starters and control devices. Make the connections to the supply and control circuits according to the indications, in general, to install the surface manual starters in mechanical rooms and recessed in the other rooms

.2 Install and wire starters and control devices as indicated.

.3 Connect the motor thermistors to the protection relay (if required).

.4 Ensure correct fuses installed.

.5 Confirm motor nameplate and adjust overload device to suit.

.6 Coordinate with mechanical sections all required connections.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section [26 05 00 - Common Work Results for Electrical] and manufacturer's instructions.

.2 Operate switches and contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

.5 Adjust the thermal protection and overload protection of each motor according to the values prescribed on the engines or group of motors.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers general and specific requirements for the supply and installation of the generator and all other components and accessories.

.2 This section also covers the dismantling of the existing generator.

1.2 RELATED WORKS

.1 Section 26 05 00 – Common work results for electrical

.2 Section 26 36 23 – Automatic transfer switches

1.3 REFERENCES

.1 American Petroleum Institute (API)

.1 API Std. 650-2007 (A2008), Welded Steel Tanks for Oil Storage 11th Edition.

.2 Canadian General Standards Board

.1 CAN/CGSB-3.6-2000, no 2, Regular Sulphur Diesel Fuel.

.3 Canadian Environmental Protection Act (CEPA)

.1 CCME PN 1326-2008, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems for Petroleum Products and Allied Petroleum Products.

.4 CSA International

.1 CSA-B139-15, Installation Code for Oil Burning Equipment.

.2 CSA/C282-09, Emergency electrical power supply for building

.3 CSA C22.2, for control devices.

.4 CSA-232-10, Electrical Safety and Essential Electrical Networks in Health Care Facilities.

.5 International Organization for Standardization (ISO)

.1 ISO 3046-1-2002, Reciprocating Internal Combustion Engines - Performance - Part 1: Declarations of Power, Fuel and Lubricating Oil Consumptions, and Test Methods - Additional requirements for engines for general us.

.6 National Electrical Manufacturers Association (NEMA)

.1 NEMA MG1-2006(R2007), Motors and Generators.

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S601-07, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids

.8 Underwriters Laboratories (UL)

.1 UL-2200 – Stationary Engine Generator Assemblies.

.9 NFPA 110 Emergency Power Systems.

1.4 DIMANTLING OF THE EXISTING GENERATOR

.1 Dismantle the existing generator including electrical connection, gaz connection and all accessories as shown on plans.

.2 The existing generator is 15.5kW, 240V, 2 phase, three wires.

.3 Waste management and disposal

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.6 Divert unused batteries from landfill to battery recycling facility approved by Departmental Representative.

.7 Divert unused antifreeze from landfill to antifreeze recycling facility approved by Departmental Representative.

.8 Fold up metal banding, flatten and place in designated area for recycling.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data :

.1 Provide manufacturer's printed product literature, specifications and data sheets for power generators and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawing :

.1 The generator drawings and data sheets should indicate the following :

.1 The make, model and performance curves of the engine.

.2 The brand and model of the alternator.

.3 The brand, model and type of equipment for the system and control of the generator

.4 The brand and type of control panel (controller) and PLC.

.5 The make, model and type of the voltage regulator.

.6 The brand, model and capacity of the battery.

.7 The make, model and type of the battery charger.

.8 The mark and type of controls and indicators of the alternator control panel.

.9 Model and type of cruise control.

.10 The diagram of the automatic ventilation system of the engine room.

.11 The cooling air flow required in m^2 / s.

.12 British standard or DIN rating of engine.

.13 The circuit diagrams shown below.

.1 Diesel fuel system.

.2 Cooling air system.

.3 Lubricating oil circuit.

.14 A dimensional drawing of the generator mounted on a steel frame, including anti-vibration fixings, the exhaust system and the drip tray.

.15 Set operation:

.1 Automatic starting, transfer to load, back to normal power and shut down.

.2 Manual starting.

.3 Automatic shut down on :

.1 over cranking,

.2 overspeed,

.3 high engine temperature,

.4 low lube oil pressure

.5 short circuit

.6 alternator over voltage

.7 High lubrication oil temperature.

.8 Excessive temperature of alternator.

.16 A complete description of the Remote Alarms Panel.

.17 Assessing Canadian Content.

1.6 CLOSEOUT SUBMITTALS

.1 Ensure that information is specific to the generator provided and not to all similar groups.

.2 The operation and maintenance manual shall include the operating and maintenance instructions. It must contain:

.1 The operating and maintenance instructions for the engine, alternator, switchboard for synchronization, generator control panel, battery charger, accumulators, fuel line, Ducting of the exhaust system, exhaust system and accessories to ensure the efficient operation of generator maintenance and repairs.

.2 Technical data :

.1 Illustrated parts lists with parts numbers.

.2 Schematic diagram of electrical controls.

.3 Precise instructions for on-site adjustment of timed relays and sensor control devices.

.4 Precise instructions for on-site adjustment of timed relays and sensor control devices.

.5 Drawings of physical clutter.

.6 The information required to set up and stop the group.

.7 Flow diagrams for:

.1 fuel;

.2 lube oil;

.3 cooling air.

1.7 MAINTENANCE MATERIAL SUBMITTALS

.1 Provide maintenance materials.

.2 Include:

.1 2 fuel filter replacement elements.

.2 2 lube oil filter replacement elements.

.3 2 air cleaner filter elements.

.4 2 sets of fuses for control panel.

.5 1 box identified to deposit spare parts.

.6 Special tools for unit servicing.

1.8 TRANSPORT, ENTREPOSAGE ET MANUTENTION

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2. PRODUCTS

2.1 SYSTEM DESCRIPTION

.1 Generator set consists of:

.1 Engine.

.2 Alternator.

.3 Control cubicle.

.4 Automatic transfer switch.

.5 Fuel supply system.

.6 Engine exhaust system.

.7 Mounting base.

.2 System designed to function as a backup or emergency power source.

2.2 DIESEL ENGINE

.1 Diesel engine : to ISO 3046-1 certified EPA Tier4.

.2 Diesel engine in four times (weathers), natural inhalation (pursuit), 4 cylinders, arranged on-line.

.3 Engine with low broadcast.

.4 Power

.1 La motor nominal power is 15.5kW/15.5kVA, 64.6 amperes, at the power factor of 1, 120/240 volts, 1 phase, 3 wires, 60 Hz.

.5 Engine Cooling System

.1 Liquid cooling: Heavy-duty industrial radiator mounted on the generator frame with motor driven exhaust fan pushing air through the radiator, ethylene glycol (50/50) antifreeze,

.2 Flow regulated by a thermostatic control in order to maintain the ambient temperature of 40 ° C.

.3 The cooling system must maintain the engine temperature within the range recommended by the manufacturer when the engine is running at an ambient temperature of 40 ° C.

.4 Engine block heater: A lubricating or circulating oil heater, thermostatically controlled.

.1 The heater circuit must be at 120 volts connected to the normal supply, from the generator cabinet; It must be equipped with a switch and protected by a fuse.

.6 Diesel fuel type A in accordance with CGSB 3-GP-6C.

.7 Speed regulator

.1 Mechanical-Hydraulic Regulator

.1 Constant speed control: ± 0.5%.

.2 No load control at full load: 5% maximum

.8 Lubrification system

.1 Pressurized lubrication by means of pump driven by motor.

.2 Lubrication oil filter: with integral flow, replaceable without disassembling the oil line.

.3 Lubricating oil cooler.

.4 Engine oil sump drain cock.

.5 Oil level gauge.

.9 Starting system

.1 Starter 12 V, cc, positive drive.

.2 Launch Limiter: shall allow three (3) successive Launch attempts of ten (10) seconds each, with a pause of five (5) seconds between attempts.

.3 Battery: 12 V, lead-acid, maintenance-free, of sufficient power to run the engine for three (3) minutes at an ambient temperature of 0 ° C without using more than 25% of rated capacity , In amperes / hour.

.4 Steel support specially treated against corrosion.

.5 Cables of sufficient length from the battery holder to the generator set.

.6 Wall-type battery charger: Constant voltage, semiconductor, four charging modes. The four modes are: Sustained Load, Hold, Equalize and Deep Load.

.1 Control of load speed: ± 2% at flow rate, for a variation of ± 10% at the inlet.

.2 The charger shall be equipped with a DC voltmeter, a DC ammeter and a witch.

.3 Maximum loader capacity: 7 A.

.4 LEDs (dust and oil-resistant LED), terminals and 120 V contacts for the following alarm states:

.1 Low battery voltage cc.

.2 High voltage of batteries cc.

.3 AC power supply.

.4 AC power loss.

.5 Overheating battery.

.6 Defective battery.

.10 Table of Indicating Devices on Antivibration Support, Including the Following:

.1 Lubricating oil pressure indicator.

.2 Lubricating oil temperature indicator.

.3 Lubricating oil level indicator.

.4 Coolant temperature indicator.

.5 Coolant level indicator.

.6 Stopwatch of operating time, tamper-resistant type.

.11 Overpressure of interference

.1 The engine and alternator shall be equipped with noise suppressors to prevent interference in the reception of A.M. radios, televisions and radiotelephone equipment :

.1 TIF (telephone influence factor) < 50 of NEMA MG1-22.43

.2 THF (telephone harmonic factor) < 3

.12 Protections designed to prevent persons from coming into contact with hot or moving parts.

.1 Protections must be placed so that it is not necessary to remove them for daily preventive maintenance inspections.

.13 Drip tray.

.14 Generator mounted on anti-vibration "pads".

2.3 ALTERNATOR

.1 Include in the control panel two 80-amp, 240-volt, molded casing circuit breakers coordinated to the alternator's destruction curve. These circuit breakers will be connected to the output of the alternator. The first will deliver the power for the load supply and the second for the connection of a load bench to perform the annual periodic tests required by CSA C282.

.2 Alternator: Complies with NEMA MG1.

.3 Rotating, brushless inductor, single stage.

.4 Shelf-protected enclosure.

.5 Shock absorber windings.

.6 Synchronous type.

.7 Rotor dynamically balanced and permanently aligned with the engine using a flexible disk coupling.

.8 Exciter: excitation Shunt.

.9 Isolation of windings: NEMA, class H. The heating must be limited to a maximum value of 105 ° C, 100% of the load.

2.4 TABLEAU DE CONTRÔLE

.1 Fully enclosed, on insulated base of the generator mounted on a support with anti-vibration dampers.

.2 Flexible cables connecting the control panel to the various components of the group, with quick connectors allowing complete replacement of the electronic assembly including regulator and governor.

.3 The surface components will be dust and oil-proof.

.4 This panel will integrate the following functions:

.1 Alternator protection, enabling intelligent, real-time monitoring of current, voltage and frequency to eliminate the risk of repeated or isolated overload, which may lead to the destruction of the alternator.

.2 Parameterization to the exact characteristics of each alternator in order to allow a reaction before the circuit breaker, without limiting the performance of the group.

.3 Fault warning contact, powered by control panel, to indicate faults that do not result in an immediate shutdown.

.4 Digital Speed Controller.

.5 Voltage regulator.

.6 Allow to interface a protection with a set of two (2) thresholds on the stator and the alternator and an electronic trip on the circuit breaker for any generator equipped with a single protection by circuit breaker.

.5 Indicators.

.1 Digital indicators on a 2-line 20-character screen, for flush mounting.

.1 Voltmeter c.a.

.2 Ammeter c.a.

.3 Wattmeter.

.4 Frequency meter with scale from 55 to 65 Hz.

.5 Kilowatt hours.

.2 Voltmeter rotary switch, panel mounted, three positions designated "Off - Phase A - Phase B".

.3 Switchable ammeter selector switch for panel mounting, designed to prevent opening of three-position circuit circuits designated "Off - Phase A - Phase B".

.4 Digital window in two lines of 16 characters:

.1 Error history and settings

.2 Production of total kWh, since last reset, per 10% of nominal load;

.3 Low oil pressure (alarm)

.4 Very Low Oil Pressure (Off)

.5 Sensor damage (alarm)

.6 Low engine temperature (alarm)

.7 High engine temperature (alarm)

.8 Extremely high engine temperature (off)

.9 Low coolant level (alarm or off)

.10 Refusal to start, alarm

.11 Excess start, stop

.12 Overspeed, stop and alarm, relay 81o

.13 Low Voltage C.C. (Alarm)

.14 High voltage level C.C. (alarm)

.15 Low Battery (Alarm), Defective Battery

.16 Low Daily Tank Fuel (Alarm)

.17 High Voltage C.A. (Off), Relay 59

.18 Low Voltage C.A. (Off), Relay 27

.19 Underfrequency (off), relay 81u

.20 C.A. Overload (Warning), Parameterizable for Load Shedding

.21 AC Overload (Alarm)

.22 Overload (Override) Relay 51

.23 Short-circuit (Off)

.24 Power Return (Off), Relay 31

.25 Lack of excitation

.26 Ground fault (alarm) (option if required)

.5 Measuring Transformers

.1 Potential transformer, dry, for indoor use.

.2 Dry current transformer for indoor use.

2.5 CONTROL

.1 Engine start button.

.2 Switch: "Off - Auto - Manual - Tests (# 1 empty, # 2 on loadbench and # 3 under live loads)".

.3 Engine emergency stop and connection terminals provided for remote emergency stop button c / a remote wiring, conduit, housing and emergency stop button.

.4 Auxiliary contacts with capacity from 10 A to 120 volts:

.1 Common alarm 1 form C contact.

.2 Form C contact relay.

.5 Voltage Control Rheostat: Inside the Control Panel.

.6 Panel-mounted indicator lights.

.1 "Normal power supply" indicator.

.2 "Emergency Power Supply" LED.

.3 Green "circuit breaker closed" light, red "circuit breaker open" light.

.7 Test button for indicator lights.

2.6 STEEL BASE

.1 The generating set shall be mounted on a steel frame of sufficient strength and stiffness to protect it against any stress or deformation during transport and installation and when in service, when installed on a level surface .

.2 The unit must be equipped with anti-vibration mounts and the control panel shall be mounted on flexible pads.

.1 Seismic spring supports, with leveling adjustment, with adjustable side shock absorbers.

.3 Soundproofing pads must be installed between anti-vibration mounts and underfloor.

2.7 EXHAUST SYSTEM

.1 Heavy duty, residential type, horizontally mounted exhaust silencer with condensate drain, plug and flanged couplings.

.2 Heavy duty flexible exhaust hose with flanged couplings as indicated.

.3 A stainless steel ball drain valve and a condensate drain hose also made of stainless steel will be installed on the silencer. The condensate drain line will be attached to the base of the shed to allow direct evacuation to the outside.

.4 Fittings and accessories as required.

.5 Expansion joints, stainless steel, corrugated, of suitable length to absorb both vertical and horizontal expansion

.6 The muffler is fully integrated into the building.

.7 Sound level to be respected: 70 dB to 7 m.

2.8 GENERATING SET OPERATION

.1 Program selector switch set at "Automatic"

.1 On normal power failure, the transfer switch send a signal to the emergency generator to start. After 0-30 s adjustable time delay to ignore transients, engine starts. Load is transferred when frequency and voltage reach rated values.

.2 On restoration of normal power, load transfers back to normal source after 0-30 minutes adjustable time delay and engine shuts down

.2 Program Selector Switch set at "Manual"

.1 Start button controls engine but automatic transfer of load prevented.

.2 Manual transfer possible.

.3 Electrical transfer possible by use of power transfer switch.

.3 Program selector switch set at "OFF"

.1 Engine will not start.

.2 Switch lockable in this position.

.4 Test full load - unit starts up and assumes building non-essential load through test transfer switch without interrupting building essential load.

2.9 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Controls: size 4 nameplates.

.3 Meters, alarms, indicating lights: size 2 nameplates

PART 3. EXECUTION

3.1 INSTALLATION

.1 Position generating set and install as indicated.

.2 Install fuel supply as indicated in accordance with CSA-B139.

.3 Install ventilating air dampers, ducts, hoods, filters and fittings, exhaust system as indicated..

.4 Channel the condensate drain from the silencer to the nearest floor drain.

.5 Complete wiring and interconnections as indicated.

3.2 CONTRÔLE DE LA QUALITÉ SUR PLACE

.1 Test in accordance with Division 01 for the results of the work.

.2 Notify Departmental Representative, 10 working days in advance of test date.

.3 Demonstrate:

.1 Automatic start, transfer to load, retransfer to normal power and unit shut down.

.2 Manual start, transfer, retransfer and shut down.

.3 Operation of automatic shut-down devices and alarms.

.4 Run unit on load for4 hours to show load carrying ability, stability of voltage and frequency and satisfactory performance of engine ventilation system to provide adequate engine cooling.

3.3 ENTRETIEN – DÉGAGEMENTS

.1 Provide 1,5 meter clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance.

3.4 AFTER-SALES SERVICE AND SUPPORTS

.1 Provide emergency telephone service 24 hours a day and 365 days a year. After receiving a call, an after-sales service team must make themselves available to the site within a maximum of 48 hours. The service team must be accredited by the manufacturer and be specialized in electromechanical generators, load switching and emergency electrical distribution.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 Materials, components and installation for electric power generating equipment and system start-up.

1.2 RELATED SECTIONS

.1 Section 26 05 00 – Common work results for Electrical

.2 Section 26 32 13.02 – Power generation to 30 km.

.3 Section 26 36 23 – Automatic Transfer Swithches.

1.3 PAYMENT

.1 Payer les services d'un technicien qualifié en groupes électrogènes à moteur diesel, conformément à la section 01 29 83 - Paiement - Services de laboratoires d'essai.

1.4 REFERENCES

.1 Canadian Standards Association CSA International

.1 CAN/CSA-B139, Installation Code for Oil-Burning Equipment.

.2 Underwriters Laboratories of Canada (ULC)

1.5 QUALIFICATIONS

.1 Use qualified diesel electric technician.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.6 Divert unused batteries from landfill to battery recycling facility approved by Departmental Representative.

.7 Divert unused antifreeze from landfill to antifreeze recycling facility approved by Departmental Representative.

.8 Fold up metal banding, flatten and place in designated area for recycling.

1.7 SYSTEM START-UP

.1 Preparation: before starting unit, carry out thorough mechanical and electrical inspection of equipment, and perform following checks and adjustments.

- .1 Disconnect battery cables from batteries to prevent accidental starting.
- .2 Turn engine several revolutions by means of hand-barring devices to ensure parts are free and there are no obstructions to its running.
- .3 Check engine/generator alignment readings to ensure they match readings attained at time of manufacture.
- .4 Check fluid levels and top up as necessary. Pre-lubricate engine and turbochargers as recommended by engine manufacturer. Install drip pan beneath engine.
- .5 .Ensure cooling system antifreeze is effective to at least minus 40 degrees C.
- .6 Check belts for correct tension and adjust as necessary.
- .7 Check and grease grease points.
- .8 Check and tighten properly nuts, bolts, etc.
- .9 Ensure safety guards are in place and properly secured.
- .10 Check linkages for damage and freedom of movement.
- .11 Check fuel supply system for leakage.
- .12 Ensure fuel supply and fuel injection systems are properly primed.
- .13 Check and tighten properly electrical connections.
- .14 Check starting battery electrolyte level specific gravity and for proper installation.
- .15 Check battery charger for proper operation and adjust as necessary.
- .16 Carry out generator winding insulation resistance test. If reading is unacceptable, carry out recognized drying procedure. Do not start unit until satisfactory reading has been achieved.
- .17 Check jacket coolant heater for proper operation.
- .18 Complete additional preparations deemed necessary

.2 Performance verification: on completion of start-up preparations, take following action.

- .1 Have at hand, during initial start-up, means for choking off air supply to engine air induction manifold in event of engine run away or other emergency.
- .2 Reconnect starting battery cables to starting battery..
- .3 Start unit only in presence of a Departmental Representative and allow to warm up. Stop unit if abnormal conditions are encountered
- .4 Check for and correct leakage from exhaust system, fuel system, cooling system, and lubricating oil system.
- .5 Adjust vibration isolators.
- .6 Observe and ensure that lubricating oil pressure and coolant temperature are within limits and no harmful vibration or sounds are evident.
- .7 Ensure voltage is within operating parameters and automatic voltage regulator is operating correctly.

.8 Ensure manual voltage control is operating correctly.

.9 Ensure frequency is within operating parameters and electronic governor is operating correctly.

.10 Check engine air ventilation system for proper operation.

.11 Check operation of engine-mounted protective sensing devices and adjust as necessary.

.12 Check phase sequence of normal power supply and ensure emergency power supply are in same sequence.

.13 Check operation of electronic controller protection, transfer, timing, metering, and annunciator functions and adjust as necessary.

.14 Check operation and calibration of analog metering and adjust as necessary.

.15 Apply electrical load, read the metres, and correlate these readings.

.16 Demonstrate.

.1 Unit start, transfer to load, retransfer to normal power, unit shutdown, on "automatic" control.

.2 Unit start, transfer to load, retransfer to normal power, unit shutdown, on "full load test" control. Unit start and shutdown, on "no load test" control.

.3 Unit cranking, start, and shutdown by means of engine-mounted key switch.

.4 Run unit on load for minimum period of [8] hours to show load-carrying capability, stability of voltage and frequency, and satisfactory performance of engine ventilating system to provide adequate cooling.

.5 Every 1/2 hour carry out and record readings on Test Chart.

.17 Perform additional tests as required by Departmental Representative to ensure unit is operating satisfactorily.

1.8 OWNER’S INSTRUCTION

.1 Provide instruction to site operation and maintenance staff for proper care, operation, and maintenance of equipment.

1.9 COMMISSIONING

.1 Do site commissioning of the diesel electric generator unit by qualified diesel electric technician.

.2 Provide commissioning report included time delay settings, operational set points and adjustment ranges.

PART 2. PRODUCTS

2.1 MATERIALS

.1 Provide following materials :

.1 Conduits and boxes as required.

.2 Copper fuel lines and fittings as required.

.3 ULC automatic fire shut-off valve.

.4 Primary fuel filter/water separator.

.5 Insulation for exhaust system.

.6 Electrical components as indicated.

.7 Wiring material.

.8 Antifreeze, ethylene glycol.

.9 Diesel fuel; storage and day tank initial fill, plus top-up after testing.

.10 Manual IPU bypass switch.

.11 All wiring and materials, including necessary rigid steel conduits and fittings for making connections.

.12 Power circuit cables.

.13 Control circuit cables.

.14 Electronic governor control cable

.15 Battery cable shall be welding cable type, extra flexible, rope stranded copper conductor with neoprene oil-resistant insulation, sized to limit voltage drop to 5% at time of peak load

PART 3. EXECUTION

3.1 LOCATING AND MOUNTING

.1 Locate unit as indicated.

.2 Fit and adjust isolators in accordance with manufacturer's installation and adjustment instruction bulletin contained in unit manual.

.3 Do not bolt housings to foundation if isolator housing feet are equipped with 6 mm rubber sound pads.

3.2 ALIGNMENT CHECK

.1 Since Engine-generator shaft alignment is adjusted at factory, check to ensure that no change has occurred due to shipment and handling.

.2 Where engine and generator housings are close coupled and instruments at hand are not suitable for measuring alignment within confines of housings, just loosen engine and generator hold down bolts and ensure that each foot is carrying proportionate amount of weight and feet are level on base plate.

3.3 FUEL SUPPLY SYSTEM

.1 Provide all required assistance for generator connection.

.2 Complete inspection of tanks and supply lines prior to connection to ensure that they are clean and free of foreign matter.

.3 Install the fuel prefilter and water separator as well as the isolation valves for service. Provide [3] replacement filter elements.

.4 Install supply and return lines between engine and daily tank. Install flexible sections between the engine and the fixed end of the pipes from the storage tank.

.5 Install pipes neatly, parallel or perpendicular to building lines without pinching or indentation.

.6 Protect fuel lines from damage.

3.4 BATTERIES AND CHARGER

.1 For wet batteries, inspect individually each battery cell and check electrolyte level. Check charge condition by measuring temperature and specific gravity of electrolyte. Consult manufacturer's instructions for recommended readings. If readings are lower, give batteries freshening charge until reading are reached.

.2 Locate batteries as indicated and ensure that batteries are accessible for service. Run and protect cables to starting motor using cables supplied with unit.

.3 Install battery charger on wall, adjacent to batteries and make connection to batteries.

.4 Clean connections and tighten securely.

.5 Install removable plexiglass cover on batteries.

3.5 CONTROL AND TRANSFER PANEL

.1 Locate panels as indicated.

.2 Make control and power circuit connections as indicated.

.3 Identify cables at both ends.

.4 Tag with slip-on wire maker, each wire end with number corresponding to number in panel.

.5 Make terminations with self-insulated terminals of flanged fork or ring type.

3.6 ADDITIONAL WORKS

.1 Complete any additional work as instructed by Departmental Representative :

.1 Ensure equipment is safe to operate.

.2 Provide complete and operating system.

3.7 FIELD QUALITY CONTROL

.1 Qualified diesel electric technician to: inspect and verify that installation of interruptible power unit is acceptable and complete. Provide inspection report to the Departmental Representative.

3.8 DEMONSTRATION AND TRAINING

.1 As directed by the Departmental Representative, carry out demonstrations of complete interruptible power unit for Project Acceptance Board.

.2 Provide familiarization training of operating and maintenance staff.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

.4 Provide fuel required for performing diesel-generator site test and top-up after acceptance test completion.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This Section specifies automatic load transfer equipment which can monitor voltage on all phases of normal power supply, initiate cranking of standby generator unit, transfer loads and shut down standby unit

1.2 RELATED SECTION

.1 Section 26 05 00 - Electricity - General Requirements.

.2 Section 26 32 13.02 - Generating set up to 30 kW.

.3 Section 26 32 13.03 - Installation of generating sets.

1.3 REFERENCES

.1 Canadian Standards Association CSA International

- .1 CAN3-C13, Instruments Transformers.
- .2 CSA C22.2 No.5, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
- .3 CSA C22.2 numéro 178, Automatic Transfer Switches.

1.4 SYSTEM DESCRIPTION

.1 Automatic load transfer equipment to :

- .1 Monitor voltage on phases of normal power supply.
- .2 .Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below preset adjustable limits for adjustable period of time.
- .3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.
- .4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on phases above adjustable pre-set limit for adjustable time period.
- .5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Include:

- .1 Make, model and type.
- .2 Un schéma de réalisation unifilaire des commandes et des relais.

.3 Description of equipment operation including: :

.1 Automatic starting and transfer to standby unit and back to normal power.

.2 Test control.

.3 Manual control.

.4 Automatic shutdown.

1.6 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for [transfer switches] for incorporation into manual.

.2 Detailed instructions to permit effective operation, maintenance and repair.

.3 Technical data:

.1 Schematic diagram of components, controls and relays.

.2 Illustrated parts lists with parts catalogue numbers.

.3 Certified copy of factory test results.

PART 2. PRODUCTS

2.1 MATERIALS

.1 Instrument transformers: to CAN3-C13.

.2 Contacteurs : conformes à la norme ANSI/NEMA ICS-2.

2.2 CONTACTOR TYPE TRANSFER EQUIPMENT

.1 Contact Type Transfer Equipment: to CSA C22.2 No.178.1

.2 Deux contacteurs monophasés montés sur un bâti commun, à deux voies, à enclenchement mécanique et électrique placés sous armoire CSA NEMA-12.

.3 Rated : 120/240 V, 60 Hz, 100 A, 2 wire and solid neutral.

.4 Main contacts: silver surfaced, protected by arc disruption means.

.5 Switch and relay contacts, coils, spring and control elements accessible for inspection and maintenance from front of panel without removal of switch panel or disconnection of drive linkages and power conductors

.6 Auxiliary contact: plated, to initiate emergency generator start-up on failure of normal power.

.7 Fault withstand rating: 14 kA symmetrical for 3 cycles with maximum peak.

.8 Lever to operate switch manually when switch is isolated.

2.3 CONTROLS

.1 Selector switch 4 position « test », « auto », « manual » et « engine start ».

.1 Test position - normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.

.2 Auto position - normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.

.3 Manual position - transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start.

.4 Engine start position - engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine

.2 Control transformers: dry type with 120 V secondary to isolate control circuits from:

.1 Normal power supply.

.2 Emergency power supply.

.3 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum.

.1 Voltage sensing:solid state type, adjustable drop out and pick up, close differential, 2 V minimum undervoltage and over voltage protection.

.2 Relais de temporisation de passage de l'alimentation normale à l'alimentation de secours, à semiconducteurs, réglable de 0 s à 60 s.

.3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 0 to 60 s delay.

.4 Time delay on retransfer from standby to normal power, adjustable 5 to 180 s.

.5 Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable 20 s intervals to 10 minutes.

.6 Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5 s intervals to 180 s.

.7 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.

2.4 ACCESSOIRES

.1 Ensure pilot lights indicate power availability normal and standby, switch position, green for normal, red for standby, mounted in panel.

.2 Plant exerciser: 168 hours timer to start standby unit once each week for selected interval but does not transfer load from normal supply transfers load to emergency supply and retransfers to normal supply on standby unit shutdown. Timer adjustable 0-168 hours in 15 minute intervals.

.3 Auxiliary relay to provide 2 contacts N.O. et 2 contacts N.F., for remote alarms.

.4 Instruments

.1 Analogue true RMS, indicating type 2 % accuracy, flush panel mounting:

.1 Voltmeter: ac, scale 0 to 260 V.

.2 Ammeter: ac, scale 0 to 150 A.

.3 Frequency meter: scale 55 to 65 Hz.

.5 Voltage transformers of dry type, designed for indoor use.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify equipment in accordance with Section 26 05 53- Identification of electrical systems.

.2 Control panel:

.1 For selector switch and manual switch: size 4 nameplates.

.2 For meters, indicating lights, minor controls: use size 3 nameplates

2.6 SOURCE QUALITY CONTROL

.1 L'ensemble du matériel, y compris le mécanisme de commutation, les commandes, les relais et les accessoires, doit être monté et mis à l'essai en usine.

.2 Aviser le représentant du Ministère 7 jours avant la date des essais en usine.

.3 Essais

.1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested.

.2 Check selector at all operating modes "test", "auto", "manual", "engine start" and record results.

.3 Check setting of voltage-sensitive relays and timing relays.

.4 Check :

.1 Automatic starting and transfer of load on failure of normal power.

.2 Retransfer of load when normal power supply resumed.

.3 Automatic shutdown.

PART 3. EXECUTION

3.1 INSTALLATION

.1 Locate, install and connect transfer equipment.

.2 Check relays and semiconductor control devices;

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Energize transfer equipment from normal power supply.

.3 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.

.4 Set selector switch in "Manual" position and check to ensure proper performance.

.5 Set selector switch in "Engine start" position and check to ensure proper performance. Return switch to "Auto" to stop engine.

.6 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10 minutes, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

.7 Repeat, at 1 hour intervals, 2 times, complete test with selector switch in each position, for each test.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section covers lighting fixtures, their components and installation methods.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1-04, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 ANSI C82.4-02 (R2007), Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps Multi Supply Type.

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.3 ASTM International Inc.

.1 ASTM F1137-00(2006), Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 Canadian Standards Association CSA International.

.5 ICES-005-07, Radio Frequency Lighting Devices.

.6 Laboratoires des assureurs du Canada (ULC).

.7 IESNA, Lighting Handbook, 10^{e} edition.

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Product Data

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

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified.

.3 Manufacturer's instructions: Submit written installation instructions provided by the manufacturer, including any instructions for specific handling, handling, cleaning.

1.4 SEISMIC PROTECTION FOR ILLUMINATING EQUIPMENT

.1 All installed luminaires must be fixed in accordance with section 26 05 49 - Earthquake protection system.

PART 2. PRODUCTS

2.1 GENERAL

.1 All devices must be products distributed in Canada and for which it is possible to have support in French.

2.2 LIGHTING

TYPES	DESCRIPTIONS	SOURCES	POWER	LIFETIME
L1	Sealed luminaire (IP65, IP66 and IP67), for ambient temperature from -40ºC to 40ºC. Installation 403 x 1146mm, suspended at 5000mm A.P.F. With aviation cable, with frosted acrylic lens, 120V, with driver dimming 0-10V.	LED, 12 000 lumens, 40K, 90 CRI	125W	L80 : 60 000 hrs
L1A	Sealed luminaire (IP65, IP66 and IP67), for ambient temperature from -40ºC to 40ºC. Installation 403 x 1146mm, suspended at 6000mm A.P.F. With aviation cable, with frosted acrylic lens, 120V, with driver dimming 0-10V.	LED, 18 000 lumens, 40K, 90 CRI	197W	L80 : 60 000 hrs
L2	Recessed luminaire in suspended ceiling, 610 x 1220mm, with acrylic lens, with dimming driver 0-10V.	LED, 4 4000 lumens, 40K, 80 CRI	35W	L80 : 60 000 hrs
L3	Rig type luminaire, 56 x 1220mm, Surface mounted, with frosted lens, 120V, with 0-10V dimming driver. Color mat black.	LED, 3000 lumens, 40K, 80 CRI	32W	L70 : 100 000 hrs L65 : 65 000 hrs
L3A	Rig type luminaire, 56 x 1220mm, Surface mounted, with frosted lens and protective grating, 120V, with pilot dimming 0-10V. Color mat black.	LED, 3 000 lumens, 40K, 80 CRI	32W	L70 : 100 000 hrs L65 : 65 000 hrs
L4	IP66 sealed outdoor projector, resistant to temperatures of -40ºC. 224 x 198mm, 120V, wall mount with bracket and power cord, black color.	LED, 4 693 lumens, 40K, 70 CRI	42W	100 000 hrs
L4A	Outside projector-type luminaire, sealed IP66, resistant to temperatures of -40ºC. 330 x 346mm, 120V, wall mount with bracket and power cord, black color.	LED, 13 916 lumens, 40K, 70 CRI	129W	100 000 hrs
L5	Recessed luminaire, Ø150mm, 120V, with dimming driver 0-10V, color white.	LED, 1000 lumens, 30K, 80 CRI		L70 : 50 000 hrs

2.3 DRIVERS

.1 Drivers for light-emitting diodes (LEDs), unless otherwise specified CSA and having the following characteristics:

.1 Rated voltage 120 V according to drawings, 60 Hz.

.2 In housings and designed for use at 40 ° C.

.3 Thermal Protection:

.1 Pilot shall reduce output power at high operating temperature until luminaire is switched off at critical temperature.

.2 When the operating temperature is returned to normal, the pilot shall automatically restore the luminaire.

.4 Dimming 0-10 V, unless indicated otherwise.

.5 Harmonic distortion rates shall not exceed 20%.

.6 Service life longer than or equal to the service life of the luminaire LED modules.

.7 Provided with short-circuit protection.

.8 Provide protection against open circuits or partial loads.

.9 Provide surge protection.

.10 Issuing Inaudible Sound Level to the Human Ear.

.11 Being of adequate power with the load connected.

.12 Power factor greater than 0.9.

2.4 FINISHES

.1 Light fixture finish and construction to meet ULC listing[s] and CSA certification[s] related to intended installation.

2.5 REPLACEMENT AND MAINTENANCE EQUIPMENT

.1 .Provide replacement equipment as follows:

.1 10% of each lamp model

.2 10% of each ballast or pilot model.

PART 3. EXECUTION

3.1 GENERAL

.1 The following clauses apply to all lighting fixtures, including specialized fixtures, unless otherwise specified.

3.2 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 The contractor will refer to the architectural plans for the exact location of the lighting fixtures.

.3 The exact location of the lighting fixtures must be coordinated with the planes of the reflected ceilings. In the cases in dispute, check with the Departmental Representative.

.4 The luminaires must be adequately supported for the type of ceiling system in which they are mounted. Mounting accessories must be adapted to the type of ceiling system, supplied with the luminaire and proposed when sending the shop drawings.

.5 In mechanical rooms and other areas where there are ceiling piping or ventilation ducts, the contractor shall install the luminaires on stems of appropriate length so that the light beam is not obstructed by piping. If necessary, install a "U" profile for installation of luminaires under the ventilation ducts. The location shown on the plans is only arbitrary and the final location will be determined on site according to the layout of the mechanics. No luminaires should be installed prior to the installation of all appliances and their piping.

3.3 LUMINAIRE SUPPORTS

.1 For suspended ceiling installations [support luminaires independently of ceiling]

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This Section specifies the equipment, components and installation for emergency lighting systems.

1.2 REFERENCES

.1 CSA International CSA C22.2 no 141-F10, Unit Equipment fo Emergency Lighting.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 S Submit in accordance with Section 26 05 00 – Electricity - General Requirements for Work Results.

PART 2. PRODUCTS

2.1 EQUIPMENT

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: as indicated.

.3 Output voltage: 24V dc.

.4 Operating time: 30 min.

.5 Battery: sealed, maintenance free.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.

.7 Semiconductor switching circuit.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, for AC Power ON.

.10 Projecteurs : montés sur le coffret du bloc d'éclairage, réglables sur 345° horizontalement et sur 180° verticalement, munis de lampes à DEL. Cabinet: for mounting directly on the wall or on a shelf and with ducts for duct connection; With removable or hinged front panel for easy access to batteries.

.11 Accessories

- .1 Test switch.
- .2 AC input and DC output terminal blocks inside cabinet.
- .3 Shelf Bracket .
- .4 Cord and single twist-lock plug connection for AC.
- .5 Anti-interference devices.

2.2 WIRING OF REMOTE HEADS

.1 Conduit: in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: in accordance with Section 26 05 21 - Wires and Cables (0-1000 V), sized as indicated in accordance with manufacturer's recommendations.

PART 3. EXECUTION

3.1 EXAMENATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for emergency lighting installation in accordance with manufacturer's written instructions.

.1 Visual inspection of surfaces / supports.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install unit equipment and remote mounted fixtures.

.2 Direct heads.

.3 Connect exit lights to unit equipment.

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This section applies to standard issue light indicators, as well as the associated installation method.

1.2 REFERENCES

.1 Canadian Standards Association CSA International

.1 CSA C22.2 no 141-10, Pictogram output signs.

.2 CSA C860-01 (december 2002), Performance of internal illuminated exit signs.

.2 National Fire Protection Association (NFPA)

.1 NFPA 101-2006, Life Safety Code.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data

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

PART 2. PRODUCTS

2.1 STANDARDS APPLIANCES

.1 Outcome indicators: Compliant with CSA C22.2 Number 141 and CSA C860.

.2 Housing: sturdy extruded aluminum, 6.35 cm deep, for universal mounting.

.3 .Front and rear plates: Extruded aluminum, incorporating a transparent polycarbonate protective panel. Each series plate must have two legend films for the selection of the pictogram and the directional arrow.

.4 Light source: White LED, consumes less than 2.5 W in AC mode and less than 1.5 W in DC mode, with a useful life of more than 50,000 hours.

.5 Power supply: two-wire universal input 120 to 347 VAC and two-wire standard input 6 to 24 Vdc.

.6 Legend film: consisting of a green pictogram and a white graphic symbol conforming to the color requirements of ISO 3864-1, "Graphic symbols - Safety colors and safety signs - Part 1: Principle Design for safety signs in workplaces and public places "and conform to the dimensions given in ISO 7010," Graphical symbols - Safety colors and safety signs - Safety signs used in the workplace And in public places ".

.7 The pictogram sign will meet or exceed CSA 22.2 No. 141-10. Exit signaling devices installed in the common corridor and corridor allowing the public access to the exit are connected to the safety lighting batteries.

PART 3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with the manufacturer's written requirements, recommendations and specifications, including any technical bulletins available, instructions for handling, storing and installing products and specifications.

3.2 INSTALLATION

.1 Install exit indicator lights in accordance with manufacturer's instructions, certification requirements, NFPA standard and local regulatory requirements.

.2 Connect exit indicators to safety lighting circuit.

.3 Ensure output circuit breaker is locked in closed position ("undervoltage").

END OF SECTION

PART 1. GENERAL

1.1 SUMMARY

.1 This Section specifies materials, installation procedures and accessories for multiplex fire alarm systems

1.2 REFERENCES

.1 Laboratoires des assureurs du Canada (ULC)

- .1 CAN/ULC-S524, Installation of Fire Alarm Systems.
- .2 CAN/ULC-S526, Visual Signal Appliances, Fire Alarm.
- .3 CAN/ULC-S527, Control Units.
- .4 CAN/ULC-S528, Manual Pull Stations.
- .5 CAN/ULC-S529, Smoke Detectors.
- .6 CAN/ULC-S530, Heat Actuated Fire Detectors.
- .7 CAN/ULC-S531, Smoke Alarms.
- .8 CAN/ULC-S537, Verification of Fire Alarm Systems.

1.3 DOCUMENTS / SAMPLES TO BE SUBMITTED FOR APPROVAL / ¸ INFORMATION

.1 Shop Drawings

- .1 Include.
  - .1 Detail assembly and internal wiring diagrams for control units Auxiliary cabinets.
  - .2 Overall system riser wiring diagram identifying control equipment, initiating zones, signaling circuits; identifying terminations, terminal numbers, conductors and raceways.
  - .3 Details for devices.
  - .4 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for fire alarm system for incorporation into manual.

.2 Include :

- .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
- .2 Technical data - illustrated parts lists with parts catalogue numbers.
- .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
- .4 List of recommended spare parts for system.

PART 2. PRODUCTS

2.1 DESCRIPTION

.1 Fully supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital, and multiplexing techniques for data transmission.

.2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general two-stage alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to monitoring agency fire department.

.3 Zoned, coded single stage.

.4 Operation of system shall not require personnel with special computer skills.

.5 System to include.

- .1 Central Control Unit in separate enclosure with power supply, stand-by batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.
- .2 Power supplies.
- .3 Initiating/input circuits.
- .4 Output circuits.
- .5 Auxiliary circuits.
- .6 Wiring.
- .7 Manual and automatic initiating devices.
- .8 Audible and visual signalling devices.
- .9 End-of-line resistors.
- .10 Annunciators.
- .11 Historic event recorder.

.6 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.7 Power supply: to CAN/ULC-S524.

.8 Audible signal devices: to CAN/ULC-S524.

.9 Visual signal devices: to CAN/ULC-S526.

.10 Control unit: to CAN/ULC-S527.

.11 Manual pull stations: to CAN/ULC-S528.

.12 Thermal detectors: to CAN/ULC-S530.

.13 Smoke detectors: to CAN/ULC-S529.

.14 Smoke alarms: to CAN/ULC-S531.

2.2 CONTROL PANEL

.1 Motherboard

.1 The control panel must be a multiprocessor system designed specifically for the fire alarm. It must be approved in accordance with the application standards indicated in the General section.

.2 The control panel must include all hardware, software and programming necessary to build a complete and operational system. It must be designed in such a way that the functions for the protection of human life have priority over all other functions.

.3 The control panel must :

.1 Provide a <DCLA> <DCLB> addressable loops having a 64 address of analogue / addressable device.

.2 Provide two 24 V DC Class B signaling devices (signaling devices), each with a rated capacity of 2.5 A;

.3 Provide a minimum supply of 24 V DC - 3.75 A shared by the two warning circuits, a 1 A continuous auxiliary power supply and a 0.5 A re-establishable auxiliary power supply.

.4 Include built-in alarm, failure and supervision relays;

.5 Features an 80-character backlit LCD display and built-in LED module for up to 16 zones; Four of the zones must be configurable into supervisory areas.

.6 Support up to 8 remotely monitored warning lights / LEDs;

.7 Support an internal digital panel / modem (DACT), panel mounted, compatible with various communication protocols and powered by normal and backup control panel sources. The modem must also be able to download, upstream or downstream, the configuration, history and current state of the system to a computer.

.8 Have a standard 10/100 Base T Ethernet port for connection to an intranet or local area network. This connection must also enable the configuration programming to be downloaded into the panel via the network and to view the diagnostic data from a remote location.

.9 Have a chronological record whose capacity is 1000 events.

.4 The control panel must meet the following requirements:

.1 Ensure electronic addressing of analog / addressable devices. Addressing by means of microswitches or rotary switches is not considered equivalent.

.2 Provide a systematic user interface for viewing, monitoring, and reporting status reports as well as commands needed to complete system programming from the front of the panel.

.3 Be able to download system programming and data on smart devices directly to a laptop, or remotely through the DACT or ETHERNET port when the system is online and operational in protected premises.

.4 Provide complete system reports, including sensor level and sensor sensitivity, functional testing, system status, device details, and diagnostic reports.

.5 Provide an authorized operator the ability to use or modify internal system functions (such as date, time, passwords, holiday dates, restart, deletion of the event history register) and to carry out system tests.

.5 The control panel must provide supervision of the components of the system, cabling, devices and software. Any system or wiring failure must be indicated by type and location on the LCD.

.6 The system must be able to compare the current program of the site with a previous version by means of a comparison utility. This utility must produce a detailed report of the differences indicating exactly what changes have been made in the hardware and software correlations.

.2 Operator interface :

.1 The operator interface must be intuitive and allow full programming of the system without the need for a portable computer.

.2 Provide separate control keys for resetting, stopping the audible tone of the panel, stopping alarm signals, exercising, disconnecting remote connections, and a keypad, arrow keys Up / down / right / left) and an input key. The user interface must also have two programmable reserve / reserve lights.

.3 At the front of the panel, a rear-illuminated LCD display should automatically display detailed information for any system condition other than normal.

.4 Provide a display module for <16> zones with red / amber lights. <Four> of these zones must be configurable in supervision areas with amber / amber LEDs.

.5 Each device address in the system must be able to be customized by a two-line text label of 20 characters each.

.6 The LCD displays the various states as follows:

.1 When the personal fire alarm system is in "normal" mode, the panel should display the current date and time and a customized two-line title.

.2 When the alarm system is in non-normal mode, the panel should display the current time, number of active points, number of points off, event number, event type and description (label).

.3 Data Link for Addressable Devices (DCL):

.1 The personal fire protection system panel must include a 100% digital loop controller that serves as an interface to intelligent microprocessor modules and detectors.

.2 It shall be possible to connect the loop controller to the detectors and modules by means of any wires and methods of wiring in accordance with section 32 of the Canadian Electrical Code without requiring the use of Twisted or shielded wire. The Loop Controller shall support Class A (DCLA) or Class B (DCLB) circuits. It should be possible to make T-junctions to connect two or more circuits from the DCL.

.3 The loop controller must be able to automatically provide an address to all intelligent microprocessor devices connected to it, without the need to set switches at the devices themselves.

.4 It shall be possible to obtain a report giving the location of all devices connected to the loop controller in order to confirm the execution drawings. This report shall show the location of the devices on the circuit, including the T-lead, and indicate the type, software parameters and address of each device connected to the circuit. The loop controller shall be able to identify all additional device addresses added to the circuit as well as any changes to the wiring since the last circuit trace report was executed. A specific failure shall be indicated on the system and maintained until such changes have been verified and accepted in the system programming by authorized personnel.

.5 The loop controller shall notify the system when a smoke detector connected to it gives a "periodic maintenance required" signal.

.6 It must be possible to set the sensitivity of the addressable smoke detectors to a different threshold according to the time of day.

.4 Alarm systems (signaling devices)

.1 Provide monitored and wired alarm circuits (warning signals) at the locations indicated on the drawings for the control of signaling equipment operating at 24 V cc.

.5 Power supply

.1 Each system power source must provide at least 3.75 A @ 24 V DC.

.2 In the event of a normal power failure (ie), the affected parts of the system must automatically switch to the secondary power supply without losing any alarm, fault or acknowledgment signals from the operator.

.3 The system must continuously monitor the system backup batteries. The voltage drop or the disconnection of the batteries must be announced immediately in the form of a fault signal, with identification of the defective batteries.

.6 Remote notification

.1 The system must be able to transmit data remotely by means of a digital alarm transmitter / communicator (DACTL signaling device) capable of using an IP interface to transmit over a local or wide area network

.2 The DACT signaler must be able to transmit information on each activity to up to 8 subscribers, using the standard Contact ID protocol.

.3 The IP interface module must provide continuous monitoring and be certified in accordance with ULC-S559 active communication protocol standards. The data must be fully coded, from the protected premises to the central monitoring station.

.4 The DACT signaler and the IP interface module must be fully monitored, with battery backup, by the fire alarm control panel. To further enhance the survival of the system, in the event of any interruption on the network, the IP module must indicate a failure on the local fire alarm control panel and automatically switch the switched call communications from the DACT.

.7 System Reports

The system must allow the operator to obtain reports: :

.1 A detailed description of the status of all system status parameters to enable the operator to take corrective action or perform the preventive maintenance program. The system must provide these reports via the primary or remote LCD, through the Ethernet connection <and must be able to print these reports to the system event printer>.

.2 A list of all detectors connected to the system that must be cleaned.

.3 The list of the sensitivity, in the form of a percentage of obscuration per foot, of all analog / addressable detectors connected to the system.

.4 The chronological list of the last 1000 events of the system.

.5 The list of software revisions of all installed items in the system.

.8 Intelligent diagnostics

.1 The personal protection system must provide the following software functions for intelligent and intuitive diagnostics :

.1 Rapid Earthing Check

.1 This function should provide a quick diagnosis of the wiring status by detecting earth leaks every 4 seconds to locate these faults much faster and determine if they have been corrected. Ground leakage must be identified precisely at the level of the addressable module, to allow for quick troubleshooting.

.2 Device racalibration

.1 The control panel must recognize all devices that have been cleaned and recalibrated automatically within 24 hours. This function will immediately restore ambient compensation and clogging levels to allow quicker verification of cleaned detectors.

.3 Functional alarm test

.1 The control panel sends a test command to activate a detector or input module. This ensures that the device is programmed correctly and works as expected.

.4 Flashing the warning light of a device

.1 It must be possible to trigger the warning light of any device by means of a menu on the control panel so as to facilitate troubleshooting of this device or to locate its location on a loop.

.5 Functional testing of the system

.1 This function will allow the operator to individually check the operation of the zones or devices without recording an alarm event in the system.

.2 It shall be possible to perform such a test by triggering the audible warning devices or by keeping them silent. In silent mode, the results of the test should be displayed on the panel LCD. In sound mode, the test shall be confirmed by sending a coded signal to the system alarm circuits.

.3 It shall be possible to perform such a test by zone or device, the remainder of the system remaining in service to protect the premises.

.4 It shall be possible to display <and print> a test report indicating the activation and restoration of all events triggered during the test.

.6 Maintenance of devices

.1 It should be possible to display <and print> a report indicating the level of fouling of all detectors in order to optimize the cleaning schedule. The ratio must be filtered to indicate devices with a fouling level of 20% or those with a fouling level of 80%. This report should indicate what device it is, its fouling (percentage) and its level of sensitivity.

.2 Detectors should automatically send an alert message to the ACL user interface, and the detector service indicator should light up when the level of contamination reaches 80%.

When this level reaches 100%, the system must indicate a failure condition to ensure that corrective action is taken.

2.3 AUXILIARY CIRCUITS

.1 Auxiliary contacts for control functions.

.2 Positive indication of the status (by feedback signal) of the controlled device.

.3 An alarm or a monitoring fault must activate the auxiliary output circuits.

.4 After the system is reset, the auxiliary contacts must return to normal operation or operate according to their pre-programming.

.5 Auxiliary circuits: 2 A, 24 V, DC, ie, fuse protected circuits.

2.4 WIRING

.1 The twisted / shielded cables will be installed in "EMT" conduit pipes without armor and will have the following characteristics:

.1 Conduit pipes shall be identified in red color every 3.0 m

.2 Massive bare copper conductors.

.3 PVC insulation.

.4 Red PVC sheath.

.5 According to CSA standard FAS-105, 300 V, identified FT-4.

.6 Cable 2 # 18 twisted / shielded for all addressable networks for detection, monitoring, control and control. In the pipeline, provide one (1) green #18 conductor for grounding all sensing, monitoring, control and control housings and devices.

.7 Cables 2 # 16 for all signaling networks. In the pipe, provide one (1) green #16 conductor for grounding all enclosures and signaling devices.

2.5 ADDRESSABLE LOOP CARD

.1 The loop board shall be the interface between the fire alarm control panel and the detectors and module.

.2 Provide short-circuit insulator modules for each floor, staircase and fire separation of the building.

.3 The network must be wired to class A.

.4 At the end of the project, the contractor, with the help of the manufacturer, will provide the Departmental Representative with a layout of the circuit illustrating all the devices connected to it. This route will allow the contractor to deliver the "as-built" plans to the owner. These plans will show the existing physical wiring and indicate the types and addresses of the devices connected to the detection wiring circuit.

2.6 VARIOUS COMPONENTS

.1 Intelligent detectors

.1 General

.1 Intelligent sensors connected to the system must be able to establish fully digital communications using a protocol combining general broadcasting and interrogation (call to be transmitted). Each detector must be capable of performing independent fire detection algorithms.

These algorithms must measure the amplitude and the time evolution of the sensor signals and combine various parameters characteristic of a fire so as to increase the reliability of detection by recognizing the conditions associated with a real fire and thus to avoid alarms Untimely. Digital filters must eliminate signals whose evolution is not characteristic of a fire. Devices which can not simultaneously analyze several parameters of a lamp or which do not employ digital filters are not acceptable.

.2 Manual bilingual warning devices

.1 The electronic addressing of each Signature Series handset must be done without requiring the use of microswitches or dial switches. Devices requiring adjustment of a microswitch or dial are not acceptable. Each manual station must have at least two diagnostic LEDs mounted on the one- or two-step input module integrated and preassembled at the factory. A green light should blink to confirm communication with the loop controller. A red light should flash to indicate an alarm. The station must be able to store up to 24 accessible diagnostic codes for easy troubleshooting. Input circuit wiring must be monitored for circuit openings and ground leaks.

.2 Manual fire alarm stations must be capable of operating in the following environment :

.1 Temperature: 32 ° F to 120 ° F (0 ° C to 49 ° C);

.2 Relative humidity: 0 to 93%, non-condensing.

.3 Automatic alarm triggering device

.1 Provide intelligent multi-sensor smoke detectors. The analog multisensor detector uses the principle of light scattering and a thermal sensor to detect any change in ambient air. Its internal microprocessor must use algorithms to dynamically analyze the data of both sensors simultaneously as a function of time and to trigger the alarm according to the results of this analysis. The multisensor must be able to adapt to the ambient conditions. The temperature sensor must automatically adjust to the ambient air temperature and give an alarm signal if this temperature rises to 65 ° F (35 ° C). The detector must continuously monitor changes in sensitivity under conditions such as dust, smoke, temperature, humidity and aging. Installing photoelectric sensors and thermal sensors at the same location may be an acceptable alternative.

.1 Temperature: 32 ° F to 100 ° F (0 ° C to 38 ° C)

.2 Relative humidity: 0 to 93%, non-condensing

.3 Altitude: 6,000 feet (1828 m) maximum.

.4 Mounting bases for detectors

.1 Provide mounting bases for detectors that can be attached to a standard North American, 3 ¼ "or 4" or 4 "square octagonal box. This base must not include any electronic components and must allow the mounting of any type of detector; It must also satisfy the following requirements :

.1 Removal of detector from base should not affect communications with other detectors.

.2 Electrical connections shall be made to the outer side of the base. The bases that must be removed to access the terminals are not acceptable.

.3 Base to allow connection of one (1) remote alarm indicator. Provide remote alarm indicators at locations indicated on plans.

2.7 INTELLIGENT MODULES

.1 General

.1 The electronic addressing of each module must be done without requiring the use of microswitches or dial switches. Devices requiring adjustment of a microswitch or dial are not acceptable. It must be possible to program on-site and change the function of the multifunction modules at any time by means of a personality code loaded electronically from the analogue loop controller. Modules that require a change of the EPROM, PROM or ROM memory or the setting of a microswitch or jumpers are not acceptable. The modules must have at least two diagnostic LEDs mounted behind a front panel. A green light should blink to confirm communication with the loop controller. A red light should flash to indicate an alarm. The module must be able to store up to 24 diagnostic codes accessible for easy troubleshooting. The wiring of the input and output circuits must be monitored for circuit openings and ground leaks. Intelligent modules must be able to operate in the following environment :

.1 .1 Temperature: 32 ° F to 120 ° F (0 ° C to 49 ° C)

.2 .2 Relative humidity: 0 to 93%, non-condensing.

.2 Control Relay Module

.1 Provide control relay modules. The control relay module must include a "C" shaped dry contact with a rated current of 2 A to 24 VDC to control external devices or to shut down equipment. The relay must be classified to provide a control function and trigger systems. The position of the relay contact must be confirmed by the system firmware. The module must be capable of being attached to a 2 ½ "(64 mm) deep or square 4" and 1 ½ "(38 mm) plain North American electrical box with single lid.

.3 Isolator module

.1 Provide isolator modules. The module allows a part of the data loop to continue to operate despite the presence of a short circuit. The line isolator module should be installed as shown on plans. The module must be capable of being attached to a 2 ½ "(64 mm) deep or square 4" and 1 ½ "(38 mm) plain North American electrical box with single lid.

.4 Single Input Module

.1 Intelligent single input modules shall be used to connect one (1) Class B input circuit.

.2 This module shall be capable of being fastened to a simple 2 ½ "(64 mm) deep or square 4" and 1 ½ "(38 mm) deep North American electrical box with single lid. The module must make it possible to connect the alarms normally open; Lock.

.5 End-of-line resistors of sufficient size to provide appropriate monitoring current for each signaling circuit.

Any opening or leakage of any circuit must alter the monitoring current of the faulty circuit to trigger an audible and visual alarm to the main control panel and to the remote panels as indicated.

2.8 FIRE ALARM SIGNALING DEVICES

.1 General

.1 All equipment must be ULC approved for use in fire protection.

.2 All stroboscopes and stroboscopes shall be capable of providing the "equivalent measures" permitted under the US Disability (ADA) Act and must be approved in accordance with UL 1971 and ULC S526.

.2 Time horns / stroboscopes

.1 Provide electronic horns / stroboscopes. These devices must have terminals for input and output wiring. The front plate must be made of red plastic. The sound power must be adjustable to two power levels (low and high). This setting must be reversible. The sound signal must also be adjusted continuously or temporally. This setting must be reversible.

.2 Strobe must produce synchronized flashes of 110 cd light intensity. The markings on the diffuser must be oriented for wall mounting of the unit. Replacement of the markings must be possible on site without having to remove the installed device. These devices must be capable of being installed on a 4-inch square North American box with extension frame, using the two screws supplied with the frame, or a 2 ¾ ".

.3 Horns shall have terminals for input and output wiring. Their front plate must be made of red plastic. The sound signal must be able to be adjusted continuously or temporarily. This setting must be reversible. The horn must produce a synchronized time signal (3-3-3).

2.9 AS BUILT RISER DIAGRAM

.1 Fire alarm system riser diagram minimum size 600 x 600 mm.

PART 3. EXECUTION

3.1 EXAMEN

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524 and TB Fire Protection Standard.

.2 Install central control unit and connect to ac power supply, ac dc standby power.

.3 Install manual alarm stations and connect to alarm circuit wiring.

.4 Locate and install detectors and connect to alarm circuit wiring. Mount detectors more than 1 m from air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.5 Connect alarm circuits to main control panel.

.6 Installer aux endroits indiqués les dispositifs de signalisation sonore et les dispositifs de signalisation visuelle, et les raccorder aux circuits de signalisation.

.7 Install signal and visual signal devices and connect to signalling circuits

.8 Connect signalling circuits to main control panel e.

.9 Install end-of-line device.

.10 Install remote relay units to control fan shut down.

.11 Splices are not permitted.

.12 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.

.13 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

.14 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.

.15 All wiring of fire alarm system shall be installed under conduit.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system

.1 Test such device and alarm circuit to ensure manual stations transmit alarm to control panel and actuate general alarm ancillary devices.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of systems.

.3 Provide final PROM program re-burn for system Departmental Representative incorporating program changes made during construction.

.4 The system shall be installed and fully tested under the supervision of a qualified representative of the manufacturer. The test shall demonstrate that the system meets all specified functions. The cost of the manufacturer's tests is not part of the contractor's tender.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by fire alarm system installation.

3.5 CLOSEOUT ACTIVITIES

.1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 The related general requirements apply to the works as described in the following sections.

.2 Management and disposal of construction / demolition waste - Section 01 74 21.

.3 Drilled piles anchored by injection - Section 31 63 19.

.4 Unfilled tubular steel piles Pile tests - Section 31 62 16.19.

1.2 MEASUREMENT PROCEDURES FOR PAYMENT

.1 Measure pile tests by number of piles tested.

.2 Unit price is to include supply and removal of all apparatus and equipment required for testing procedure, costs for specialist required for testing and cost of temporary protective structures and lighting.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM), latest editions

.1 ASTM D1143, Standard Test Method for Piles Under Static Axial Compressive Load.

.2 ASTM D4945, Standard Test Method for High-Strain Dynamic Testing of Piles.

1.4 DOCUMENTS / SAMPLES TO SUBMIT FOR APPROVAL / INFORMATION

.1 Provide submittals in accordance with Section 01 33 00 - Submittal procedures.

.2 Submit 2 weeks before testing, outline of test method to be employed as specified and include drawings showing details of test set up.

.3 Quality assurance submittals:

.1 Test reports: submit 3 copies of test reports for piles from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

PART 2 PRODUCTS

2.1 MATERIALS

.1 No subject.

PART 3 EXECUTION

3.1 GENERAL

.1 Allowable design load capacity of pile at specified load as indicated on foundations plans.

.2 2 weeks before testing, provide Ministry Representative with outline of test method to be employed in accordance with ASTM D1143 or ASTM D4945.

.1 Include drawings showing details of test set up.

.3 Supply and erect equipment and temporary structures necessary for making tests.

.4 Ministry Representative to select piles for testing during performance of Work.

.5 Test to be performed in presence of Ministry Representative.

.6 Provide shelter, enclosures and lighting for observation, testing and recording of data.

3.2 TESTING

.1 Do compression pile tests and prepare reports in accordance with ASTM D1143 except as specified.

.2 Do dynamic tests and prepare reports in accordance with ASTM D4945 except as specified.

.3 Test 2 days after placement of test pile.

.4 Remove apparatus and equipment on completion of test.

.5 provide test report in 3 copies, in accordance with ASTM D1143 except as specified.

3.3 TEST EVALUATION

.1 Qualified geotechnical engineer to interpret results for predicting pile performance and capacity.

.2 If pile fails load test, do additional tests according to requirements provided by Ministry Representative.

.3 Test validity is determined by Ministry Representative.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 General requirements apply to the work described in this section

.2 Section 01 74 21 - Construction-demolition waste management and disposal

.3 Geotechnical study:

.1 See Appendix A.

1.2 DEFINITIONS

.1 The following definitions apply throughout this section of the quote

.1 Professional: consultant in structure or its representative on site during work execution.

.2 Plans: unless otherwise annotated, drawings sealed and signed by the professional in structure and issued for execution of works.

.3 Laboratory: expert in quality control of materials and geotechnical designated by the client. The laboratory is, as such, empowered to issue directives to which the Contractor must comply.

1.3 REFERENCES

.1 This quotation refers to the latest edition and revision of codes and standards.

.1 ASTM C117, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.5 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).

.6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.7 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

.8 CSA A23.1 - A.23.2: "Concrete materials and methods of concrete construction, test methods and standard practices for concrete"

1.4 GENERAL REQUIREMENTS

.1 Work site visit with terrain topography examination: natural and artificial obstacles, access roads and other local conditions that could affect the execution of such work.

.2 Comply with provincial and municipal regulations governing the execution of the work described in this section of the estimate, especially those related to environmental protection and shoring of excavations.

.3 The work is governed by a waste management plan in accordance with Section 01 74 21 - Construction-demolition waste management and disposal. The work of this section must be carried out respecting the requirements of the plan which will be implemented by the Contractor. All subcontractors must comply.

1.5 SOIL TYPE

.1 Geotechnical study report, near the land where the work will be performed, must be annexed to the contract documents of the Contractor.

1.6 LINES AND LEVELS

.1 Prior to the start of works, position and fix all landmark terminal required for locating and delimiting the area and depth of the excavations that will be executed.

.2 Replace or immediately rectify any landmark terminal that has been removed or moved before the excavation and concrete work for which it is required have been completed and approved by the Professional.

1.7 PERMITS AND REGULATIONS

.1 No subject

1.8 PROTECTION OF PUBLIC SERVICES AND STRUCTURES

.1 The Contractor must take good care of all utilities (water, sewer, gas, electricity, telephone, sidewalks, paving, etc.) underground or elevated that his work can affect. All utilities have the support and protection required. These utilities may belong to private companies or public bodies.

.2 The Contractor is responsible for any damage that may happen to them as a result of construction operations. He must make the necessary checks with public bodies, private companies that own the damaged utility. The location of the pipes on the plans is generally rough and field audits should be conducted to accurately locate underground services.

.3 If necessary, excavation near conduits and underground structures must be made by hand. These conduits and underground structures should not be backfilled before the Professional has inspected them.

.4 Pavement or sidewalks must be sawn to the boundary of the excavation prior to the actual excavation work. It is not allowed to break a pavement, a curb or sidewalk using the bucket of an excavating machine or with another similar method.

1.9 EXISTING PERIPHERAL STRUCTURES

.1 Take every precaution to avoid damaging the landscaping, buildings and other man-made structures on the periphery of the site. If necessary, make all repairs to the satisfaction of the owner and assume all costs.

.2 Before starting work, accompanied by the client company and the Contractor's insurer, make a complete inspection of buildings and other surrounding structures that could be damaged during the execution of the work. If necessary, submit to the Professional, a written report including photos or a video showing all existing defect that has been identified and could possibly be the subject of a claim for damages.

1.10 BUILDING MAINTENANCE

.1 Prevent airborne dust on site and avoid burning combustible debris from the excavation or demolition or any other source.

.2 The removal of undesirable materials must be done every day.

.3 Avoid pile up of debris in places where they can threaten the stability of excavation slopes or restrain the natural drainage of the work site.

.4 Protect the excavation slope against erosion, landslides and other phenomena of natural or accidental source that may damage or delay the normal progress of work.

1.11 SECURITY MEASURES

.1 Strictly comply with the requirements of Article 3.15: Excavations and trenches of the Safety Code for the construction work, 2.1 S, r.6 published by the Québec Official Publisher.

1.12 WORK SUPERVISION

.1 Professional will conduct an evaluation of soil quality at the bottom of excavations and evaluation of foundation embankments quality. The Contractor must at all times cooperate with the Professional and make available equipment on site so that he can quickly and effectively perform his job. The Contractor must cooperate during backfilling to allow the Professional to verify the compactness of the materials used and their quality.

.2 The Contractor must not claim any supplement to contract amount because of delays caused by the Professional intervention to carry out its quality control work during the execution of backfilling.

1.13 AUTHORIZATION OR APPROVAL OF THE PROFESSIONAL

.1 In accordance with the requirements of this section, the permission or approval of the Professional must not be regarded as having been obtained until he has been notified in writing or recorded in the minutes ratified by all persons attending meeting and where Professional was also attending.

.2 The Professional may delegate a laboratory to represent him in evaluation in regard to the quality of materials and work. The laboratory is, as such, empowered to issue directives to which the Contractor must comply.

Part 2 PRODUCTS

2.1 ORIGIN AND APPROVAL OF MATERIALS

.1 Before starting work, the Contractor must inform the Professional of the origin of borrowed materials he intends to use.

.2 The Contractor must provide recent reports of particle size analysis and qualitative testing, performed by a recognized laboratory, certifying that all materials meet the requirements of the quote.

.3 Professional reserves the right to perform at the client's expense, by a recognized laboratory, particle size analysis and qualitative tests certifying that all materials meet the specification requirements and the Contractor must cooperate to provide required samples.

.4 Borrowed materials must not contain anything likely to swell.

.5 The Contractor must not use any material before it is approved in writing by the Professional.

2.2 GRANULAR MATERIALS

.1 Quality

At least 95% of the results of tests conducted by a laboratory or laboratories must meet the following specifications:

Trials	Granual Material	Granual Material	Sand or gravel
Petrographic max. number	200	300	400
Durability MgSO4 (% max.)	20	25	35
Los Angeles (% max.)	50	50	50
Micro-Deval (% max.)	33	36	45
Fragmentation (% min.)	50	50	-
Organic materials (% max.)	0,8	0,8	0,8

.1 Petrographic number

BNQ-2560-900 "Determination of petrographic number of coarse aggregate"; the maximum is 175 instead of 200 in the case of a non-paved road surface.

.2 Durability

BNQ-2560-450 "Aggregates - Determination of resistance to disintegration by a magnesium sulfate solution" (5 cycles); specified losses apply respectively to the coarse aggregate and fine aggregate.

.3 Los Angeles

BNQ-2560-400 "Aggregates - Determination of abrasion resistance using the device Los Angeles"; the maximum is 32 instead of 50, in the case of crushed stone from limestone quarries.

.4 Micro-Deval

BNQ-2560-070 "Aggregates - Determination of the wear by attrition coefficient using the Micro-Deval apparatus"; the maximum is 30 instead of 33 in the case of a layer of unpaved rolling.

.5 Fragmentation

The percentage shown is the percentage by weight of comminuted particles having at least one face fractured by crushing and retained on the sieve of 5 mm.

.6 Organic materials

The standard test is based on the book "aggregates Technology" on page 329, ed. 1983 (Aïtcin, Jolicoeur and Mercier).

.7 Standards

The standard testings BNQ 2560-900-and-BNQ 2560-450 are replaced by the BNQ 2560-070-standard for aggregates from limestone quarries.

.2 Granulometry

.1 Crushed stone MG 56 (60-0) (complying with NQ Standard 2560-114, Civil Works - aggregates)

Sieve	**Percentage passing (% weight)**
80,00 mm	100
56,00 mm	82-100
31,50 mm	55-85
5,00 mm	25-50
1,25 mm	11-30
0,325 mm	4-18
0,080 mm	2-7

.2 Crushed stone MG 20 (20-0) (complying with NQ Standard 2560-114, Civil Works - aggregates)

Sieve	Percentage passing (% weight)
31,50 mm	100
20,00 mm	90-100
14,00 mm	68-93
5,00 mm	35-60
1,25 mm	19-38
0,325 mm	9-17
0,080 mm	2-7

.3 Crushed stone BC 5-20

Sieve	Percentage passing (% weight)
28,0 mm	100
20,0 mm	90-100
10,0 mm	25-60
5,0 mm	0-10
2,5 mm	0-5

.4 Sand or gravel

Sieve	Percentage passing (% weight)
31,5 mm	100
5,0 mm	35-100
0,080 mm	0-10

.5 Slurry

Sieve	Percentage passing (% weight)
9,5 mm	100
5,0 mm	93-100
2,0 mm	70-100
0,4 mm	15-57
0,080 mm	0-17

.6 Geotextile

1. geotextiles must be rot-proof, insensitive to the action of acids and bases and unassailable by microorganisms and insects, and must meet the following requirements:

Trials	Requirements	Standards
Tensile strength in length and minimum width (N)	350	CAN / CGSB – 4.2 – 12.2
Bursting strength (Mullen) minimum (kPa)	2200	CAN / CGSB – 4.2 – 11.1
Minimum tensile force (N)	750	CAN / CGSB – 4.2 - 9.2
Minimum thickness	2 mm	CAN / CGSB – 4.2 – 37

1. Peripheral drain

1. The corrugated and perforated thermoplastic conduits must comply with the following requirements:

1. Conduits of 100 mm, 150 mm, 200 mm and 250 mm in HDPE compliant to BNQ 3624-122, class 400.

2. Conduits of 300 mm in HDPE compliant to BNQ 3624-110, class 300.

Part 3 EXECUTION

3.1 FOUNDATION AREA

.1 The bottom of the excavation must be cleaned by hand. Foundation bedding must be horizontal but may form several levels separated by siding as vertical as possible.

.2 Any excavation deeper than what is shown on the drawings is the responsibility of the Contractor as well as the measures determined by the Professional to correct the situation.

.3 The Contractor must take the necessary precautions to prevent softening of natural soil under foundations and embankments. If in regard to the Professional’s opinion, the bedding becomes unsuitable, the Contractor must further excavate to achieve an acceptable support. The additional excavation and incidental remedies are made at the expense of the Contractor.

.4 The Contractor is not allowed to excavate to a depth greater than what is specified in the drawings; if doubtful soil is discovered during the inspection of the Professional and/or the laboratory, he will notify in writing of the solution.

3.2 EXCAVATION

.1 Take the necessary precautions not to disturb soil below the level of pile heads, footings, slabs on ground or other structure. Remove any disturb soil from bedding.

.2 Immediately remove from site, all excavated material that will not be reused.

3.3 EXCAVATION FOR SLABS ON GROUND AND PAVED SURFACES

.1 Unless otherwise specified, the Contractor must make the necessary excavations to avoid setting up compacted granular backfill on organic soil or topsoil. Bedding must be natural ground, undisturbed, free of organic matter and also accepted by the Professional. The excavation will be deep enough to allow the establishment of granular backfill thickness specified on the drawings.

.2 Refer to section 3.9 for additional information concerning the slabs on ground and paved surfaces.

3.4 DRYDOWN OF EXCAVATIONS

.1 If necessary, build and maintain in operation an adequate network of ditches connected to header tanks. The location of such tanks must be approved by the Professional.

.2 Install in the working collection pits and pumps with sufficient capacity to quickly drain the water that accumulates.

.3 The Contractor must, at its expense, maintain excavations free of water, snow and ice as long as they have not been backfilled.

3.5 REMOVAL OF EXCAVATED MATERIAL

.1 Immediately remove from site, all excavated material that will not be reused later as backfill.

.2 It is prohibited to file or store excavation material on pavement, sidewalks, alleys, on any other public property, or already built structures.

3.6 DRAINAGE

.1 The Contractor must provide and arrange ditches for pumps, drains, pipes and all other means necessary to remove water from trenches, excavations and other parts of the work and must, where necessary, evacuate all surface and ground waters, whether from natural sources, seepage, leakage or flow of sewage pipes, drains or other man-made structures.

.2 The Contractor must also keep dry excavations and other portions of the work until the permanent works of drainage to be built is completed.

.3 The Contractor must properly control, divert and evacuate all surface water that may enter the locations where the work is performed under contract until provisional acceptance.

3.7 PROTECTION AGAINST FROST

.1 If work is performed in cold weather, make sure the excavations as soon as they are completed, are effectively protected against freezing in order to build on unfrozen ground, free of snow and ice and to avoid damage by frost effect to the already built or neighboring structures; cover the bottom with an insulating material of suitable thickness or use any other method approved by the Professional.

.2 The Contractor must, at his expense, protect against frost excavations until the pile heads, stringers, walls and similar elements have been completely casted and backfilled.

3.8 INSPECTION AND ACCEPTANCE

.1 Before casting or backfilling, the Contractor must ensure that the Professional or the laboratory has inspected and accepted the subgrade and the works that will be hidden by the embankment or the structural elements.

.2 The Contractor must notify the Professional at least 24 hours before the backfill of any material; the Contractor must provide his cooperation to facilitate the inspection.

3.9 CONSTRUCTION OF EMBANKMENTS

.1 Backfill materials must be implemented in a way that no exaggerated effort or damage will be caused to works.

.2 When backfilling is necessary on either side of a foundation wall, it must be made simultaneously on both sides.

.3 Where the filling on one side, it must be done only after all elements that ensure stability of the wall are in place.

.4 Before backfilling, the Contractor must ensure that the Professional has inspected and accepted the subgrade and the works that will be hidden by the embankment.

.5 When work begins, check that the surfaces to backfill remained clean, dry and free of snow and ice and there was no softening or subsequent soil disturbance; it is prohibited to build embankments on the frozen ground.

.6 Ensure that backfill material is not frozen and contains neither snow nor ice, and debris.

.7 The materials must be deposited in layers of up to 300 mm thick. Each layer must be densified separately using mechanical devices capable of providing the specified densities.

.8 The cover over and around conduits should be done with care so that no damage or movement in caused to conduits and prevent thereafter, sagging of the slab, floor or other structure located above.

.9 All conduits buried within the works, backfill from minimum 150 mm under the grade of the pipe to the height of the axis with sand or gravel dust. Backfill the remainder of the excavation with a granular material, crushed stone, complying with the abovementioned standards, compacted to the specified density.

.10 If devices or other drains are requested on the plans, backfilling around these drains, 50 mm below 200 mm on each side and 300 mm above, must be made of crushed stone, clean, consistent with caliber BC 5-20 from Ministry of Transportation.

.11 Unless otherwise stated in the drawings, the embankment immediately below the slab on grade or under the asphalt will have a minimum thickness of 150 mm and will be crushed stone caliber 20 MG

.12 The soil to be compacted must achieve a minimum density of 95% according to Proctor changed in the last 150 mm from the upper layer.

.13 After densification, the sand borrowed material, gravel or crushed stone must reach a density of 95% following the modified Proctor test (ASTM D-1557), the entire thickness of each layer, unless indications contrary to the plans.

3.10 OTHER BACKFILLING WORK

.1 Other backfilling work includes all those required outside of the foundation walls.

.2 As the space above the trenches of the peripheral walls or other trenches must be paved, underlying embankments, from the undisturbed natural ground, must be made as those inside, if not otherwise indicated on landscaping plans.

3.11 POSITIONNING OF GEOTEXTILE

.1 Where indicated on drawings, position a geotextile membrane and take the necessary steps to keep it in position until the embankment is added.

.2 Overlap geotextile joints to a length of 1000 mm.

3.12 COMPACTION TESTS

.1 The client may perform compaction tests by a laboratory of his choice. The cost of these tests is paid for by the client.

.2 This inspection does not relieve any responsibility of the Contractor of his obligations to perform the work according to the plans and specifications; it is not a guarantee that they were executed according to plans and specifications.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 The related general requirements apply to the works as described in the following sections.

.2 Management and disposal of construction / demolition waste - Section 01 74 21.

.3 Drilled piles anchored by injection - Section 31 63 19.

.4 Pile tests - Section 31 09 16.28.

1.2 MEASUREMENT PROCEDURES FOR PAYMENT

.1 Method 1:

.1 Measure supply of steel pipe piles in metres delivered to site, in lengths indicated by the Ministry representative.

.2 Mobilization of equipment: paid as lump sum item.

.3 Actual number and lengths of piles installed: established by Ministry representative from piling records.

.4 Unit of measurement for piles: per metre measured from tip elevation to cut-off elevation at pile cap.

.5 Measure load tests, in accordance with Section 31 09 16.28 - Pile Tests.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International), latest editions

.1 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.

.4 CSA W59, Welded Steel Construction (Metal Arc Welding) (metric version).

.5 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.6 CSA-Z245.1, Steel Pipe.

.2 The Master Painters Institute/MPI ASM, Architectural Painting Specification Manual.

.1 MPI #19, Inorganic Zinc Rich Primer.

.3 The Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volume 2, Systems and Specifications.

.1 SSPC-SP2, Hand Tool Cleaning.

.2 SSPC-SP3, Power Tool Cleaning.

.3 SSPC-SP5/NACE No.1, White Metal Blast Cleaning.

.4 SSPC-SP6/NACE No.3, Commercial Blast Cleaning.

.5 SSPC-SP7/NACE No.4, Brush-Off Blast Cleaning.

.6 SSPC-SP8, Pickling.

.7 SSPC-SP10/NACE No.2, Near-White Blast Cleaning.

1.4 DOCUMENTS / SAMPLES TO BE APPROVED / INFORMATION

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheet.

.3 Submit shop drawings and indicate: splice detail.

.1 Each drawing stamped and signed by professional engineer registered or licensed in Province of Quebec.

.4 Quality Assurance:

.1 Prior to fabrication, and, if requested, provide Ministry representative with 2 copies of steel producer's certificates in accordance with ASTM A252.

.2 One Charpy V-notch test required per heat and results reported to Ministry representative by manufacturer.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Submit details of pile stock material to be used, as described in PART 3 - FABRICATION, for review by Ministry representative.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle in accordance written manufacturer’s instructions.

.2 Deliver new, undamaged materials to site, accompanied by certified test reports, with manufacturer's logo and mill identification mark provided on pipe piling.

.3 Storage and Protection:

.1 Store and handle pipe piling in accordance with manufacturer's written instructions to prevent permanent deflection, distortion or damage to interlocks.

.2 Support pipe piling on level blocks or racks spaced not more than 3 m apart and not more than 0.60 m from ends.

.3 Store pipe piling to facilitate required inspection activities and prevent damage to coatings and corrosion prior to installation.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Steel pipe, of sizes and wall thicknesses indicated cut ends to requirements of API SPEC 5L.

.2 Pipe material to have following minimum properties:

.1 Conventional elasticity limit: 241 MPa.

.2 Weldable steel: to ASTM A106/ASTM A106M carbon equivalent less than 0.55%.

.3 Pipe allowable tolerances:

.1 Deviation from straight line, specified diameter, wall thickness and out-of-roundness on body of pipe and at pipe ends to conform to API SPEC 5L.

.2 Pipe to be checked for deviations before leaving mill.

.4 Joints: Grade M300, category WT, according to CSA-G40.20/G40.21.

.5 Welding electrodes: to CSA W48 series.

.6 Concrete: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.7 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing, sizes and details as indicated.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 FABRICATION

.1 Fabricate full length piles to eliminate splicing during installation wherever possible.

.2 Full length piles may be fabricated from piling material by splicing lengths together.

.1 Use complete joint penetration groove welds for splices.

.3 Submit details of planned use of pile material stock to Ministry representative for approval prior to start of fabrication. Re-use cut-off lengths as directed by Ministry representative.

.4 Allowable tolerance on axial alignment to be 0.25% as measured by 3 m straight edge.

.5 Allowable deviation from straight line over total length of fabricated pile to be 50 mm.

.6 Repair defective welds as approved by Ministry representative.

.1 Repairs: to CSA W59.

.2 Unauthorized weld repairs may be rejected.

.7 Repair damaged exterior protective coating of piles.

3.3 PAINTING AND COATING

.1 Painting requirements include surface preparation of outer surfaces of piling, application of inorganic zinc coating and coal tar epoxy coatings and touch-up after delivery if necessary.

.2 Do not paint portions of pile, which are to be encased in concrete.

.3 Paint piles as specified by Ministry representative.

.4 Surface preparation:

.1 Sand or grit blast in accordance with SSPC-SP3.

.2 When blasting is completed remove dust by brush or vacuum prior to painting.

.3 Remove oil, grease or organic matter, with approved solvents or detergents prior to painting.

.4 Apply first coat of paint same day as completion of sand or grit blasting.

.5 Application:

.1 Apply three (3) coats, each in accordance with manufacturer's recommendations.

.2 First coat, inorganic zinc: apply to average 75 micrometres dry-film thickness and minimum 65 micrometres thickness.

.3 Second and third coats: coal tar epoxy; apply to average single coat dry-film thickness of 180 micrometres.

.4 Painted surfaces to be free from sags and runs.

3.4 INSTALLATION

.1 If approved by Ministry representative, splice piles in place during installation by welding.

.1 To prevent distortion, tack opposite points first and then weld opposite sections for pipe walls thinner than 10 mm weld against a back up ring. Hold members in alignment during splicing operation.

.2 Make splice by complete joint penetration groove welds as indicated on shop drawings.

.2 Perform internal visual inspection of steel pipe, joints and base prior to placing of concrete.

.1 Ensure pipe inside is free from foreign matter.

.3 Assemble and install reinforcement cages as indicated.

.4 Install concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.5 Fill steel pipe pile with concrete using methods to limit free fall and to prevent segregation. Ensure adequate vibration to completely fill cross section of pipe.

.1 Ensure adequate vibration to completely fill cross section of pipe.

.6 Set dowels in concrete in accordance with details as indicated.

.1 Secure until concrete is set.

.7 Install pile caps as indicated.

.8 Install driving shoes as part of field work.

.9 Touch up scratched or uncoated surfaces with three (3) applications of inorganic zinc coating and coal tar epoxy, as required by Ministry representative.

3.5 WELDING

.1 Weld to CSA W59.

.2 Welding certification of companies: to CSA W47.1.

.3 Welding certification of companies welding steel reinforcing bars placed in reinforced concrete: in accordance with CSA W186.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 The related requirements apply to the described works in the following sections.

.2 Management and disposal of construction and demolition waste - Section 01 74 21.

.3 Steel tube piles – Section 31 62 16.19

.4 Pile tests - Section 31 09 16.28.

1.2 MEASUREMENT PROCEDURES FOR PAYMENT

.1 Measure caissons in total linear metres of length incorporated into Work.

.2 Measure caisson material added or deducted in event actual bearing is below or above specified depth indicated in linear metres.

.3 Measure load test, when ordered, under Section 31 09 16.28 - Pile Tests.

.4 Base tender on number and lengths of piles as indicated.

.5 Actual number and lengths of piles installed will be established by Ministry Representative from piling records.

.6 Measurement for piles will be in metres measured from base elevation to cut-off elevation.

1.3 REFERENCES

.1 ASTM International, latest editions

.1 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A252, Standard Specification for Welded and Seamless Steel Pipe Piles.

.3 ASTM A1008/A1008M, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

.2 CSA International, latest editions

.1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA G30.18, Carbon and Steel Bars for Concrete Reinforcement.

.3 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.4 CSA S16, Design of Steel Structures.

.5 CAN/CSA-S6, Canadian Highway Bridge Design Code.

.6 CSA W59, Welded Steel Construction (Metal Arc Welding).

1.4 DOCUMENTS / SAMPLES TO SUBMIT FOR APPROVAL / INFORMATION

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for piles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.

.4 Field Quality Control Submittals:

.1 Maintain field driving records for each shell, including elevation of bedrock, driven depth of pile and rock socket depth, cut-off elevation of shell and protruding core.

.2 Provide Ministry Representative with three copies of field records.

.3 Submit detailed method statement and procedures for controlling and monitoring verticality and alignment of piles before starting pile installation.

.4 Submit mill report and results of concrete tests.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect piles from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Welded straight steel pipe caisson shell to diameters and wall thickness as indicated, plain ends, to ASTM A252.

.2 Straight seamless and welded steel pipe: to ASTM A53, formed from flat plate to diameters and wall thickness as indicated.

.3 High carbon steel pile shoe: to ASTM A53, welded to bottom of first pipe shell.

.4 Wide welded plate sleeves: to ASTM A1008/A1008M, and as indicated, external 300 mm forming connections between lengths of steel pipe shell formed from flat plate.

.5 Welding materials: to CSA W59.

.6 Concrete mixtures and materials: to CSA A23.1/A23.2, Section 03 30 00 - Cast-in-Place Concrete.

.7 Grout: to Section 03 30 00 - Cast-in-Place Concrete.

.8 Reinforcing steel: to CSA G30.18, Section 03 20 00 - Concrete Reinforcing.

.9 Steel core sections: to CSA G40.20/G40.21.

2.2 SOURCE QUALITY CONTROL

.1 Mill report: to CSA S16.

.2 Concrete tests: to CSA A23.1/A23.2.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pile installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Ministry Representative.

.2 Inform Ministry Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Ministry Representative.

3.2 STEEL ARMATURE

.1 Prepare caisson shells with sufficient rigidity to avoid any damage or deformation during handling.

.1 If the armature is made of more than one segment, the bars must be sufficiently long to be able to cover the splices

.2 The splices to be covered must be done by welding.

.2 Weld Tie-rods to main steel reinforcements.

.3 Splice weld must be accredited by Canadian Welding Bureau (CWB).

3.3 CONCRETE PLACEMENT

.1 Concrete and placement methods: to CSA A23.1/A23.2, Section 03 30 00 - Cast-in-Place Concrete.

.2 Complete placing of concrete to required elevation within shell as approved in writing by Ministry Representative.

.3 Cut off top of shell neatly and squarely at elevations as indicated.

.4 Protect steel reinforcement core projecting above concrete in caisson.

3.4 DEFECTIVE CAISSONS

.1 Replace, repair or modify caissons in accordance with written instructions from Ministry Representative.

.2 Defective pile to be cut off at elevation as directed by Ministry Representative and filled with sand.

3.5 LOAD TESTING

.1 Test pile in accordance with Section 31 09 16.28 - Pile Tests. Test pile will be used to confirm pile load capacity.

.2 Piles driven before completion of satisfactory confirmation test on test piles will be at Contractor's risk.

END OF SECTION

Part 1 GENERAL

Appendix A provides site visit report, case number 635404-0000-4EGD-0001_0, prepared by Marianne Gagnon.

SNC Lavalin-Stavibel inc.
1271, 7e rue, Val-d'Or (Québec) J9P 3S1
Téléphone : 819-725-2233
Courriel : stavibel-vd@stavibel.qc.ca

Borehole Log

Client : **Public Services and Procurement Canada**
Project # : **635404-0000**
Location : **Administrative building, Kuujjuaq airport (Qc)**
Drawing by : **Marianne Gagnon** Date : **09 nov 2016**
Verified by : **Véronique L-Rivard** Date : **10 nov 2016**

Site : **FO-16-04**
Surface condition : **Sandy gravel**
GPS Coordinates : **58° 06' 12,3' ' N ; 68° 25' 12,2' ' W**
Drilling contractor : **Forages Rouillier**
Ground elevation : **N/A**

Depth (m)	Description	State	% Rec.	Type n°	Samples / Analysis	Observations O	Observations V	Depth (m)
0 – 2	Sandy gravel Sand, gravel traces and blocks							
2 – 14	Sandy silt, gravel traces and blocks		10 (blocks)	DD	No sample	I	I	
14	**End of borehole ~14,0 m**							

Sampling method :
DD diamond drill

State :
- Recast
- Non recast
- Lost
- Drill core

Observations :

Visual (V)
N : Nonexistent
D : Disseminated
IM : Imbibed

Olfactory (O)
N : Nonexistent
L : Light
M : Medium
P : Persistent

Note :
Drilling carried out on oct 7th 2016.
Located 5,6m west of the west wall of the administration building.
Drilling stoped before reaching the bedrock due to airport obligation 13-31.